

DOCUMENT RESUME

ED 332 000

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TITLE Technology Edu-Camp 1988. Computer Aided Drafting & Design and Electronics. Adjunctive Report for the Program Improvement Administrator.

INSTITUTION Arkansas State Univ., Beebe.; Wilbur D. Mills Education Service Cooperative, Beebe, AR.

SPONS AGENCY Arkansas State Dept. of Education, Little Rock. Div. of Vocational and Technical Education.

PUB DATE 88

NOTE 133p.; Photographs will not reproduce clearly. Contains some light type.

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IDENTIFIERS *Arkansas State Technical Institute

ABSTRACT

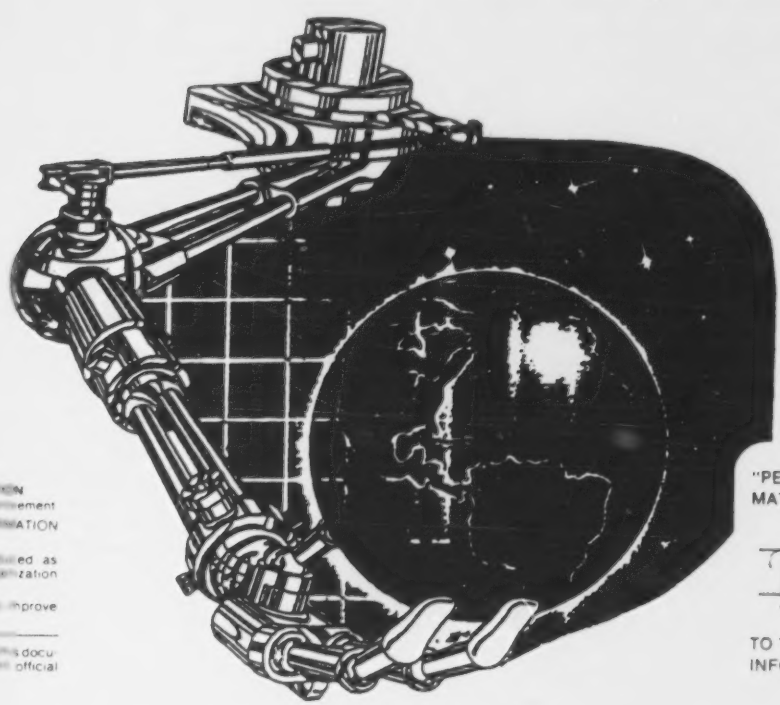
The Technology Edu-Camp described in this report was held in July of 1988 at Arkansas State Technical Institute. Purposes were: to provide vocational instructors an opportunity to expand their knowledge and understanding of the needs of technical occupations; to upgrade their technical skills; and to develop lesson materials for courses in electronics and computer-aided drafting and design (CADD). Except for a brief program description which also contains the program budget, attendance records, and a copy of a local newspaper article about the program, the bulk of this document consists of an appendix containing project materials including an announcement brochure and registration form, a management plan, budget, schedule, program of activities, pretest-posttest grades of participants, participant comments, photos, and laboratory activity packets (LAPs) for CADD and for electronics. The LAP for CADD contains 10 activities that cover the following topics: equipment terms and definitions, terminology, turning on systems and bringing up the menu, computer-aided drawing, border with titles, drawing, multiview, orthographic drawing, isometric drawing, and architectural drawing. The electronics LAP includes nine activities that cover electronics terminology, symbols and terms, drawing to scale an "OR" generator, hex number conversion, equations using Ohm's Law, problem solving using Ohm's Law (two activities), soldering, and electrical symbols in diagrams. Each LAP includes conditions provided, performance objectives, success criteria, information sheet, activity assignment, quiz, and quiz answers. (KC)

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TECHNOLOGY EDU-CAMP 1988

ED332000



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COMPUTER AIDED DRAFTING & DESIGN AND ELECTRONICS

Sponsored by
the Wilbur D. Mills Education Service Cooperative
and the Arkansas State Technical Institute

Held at Arkansas State University - Beebe

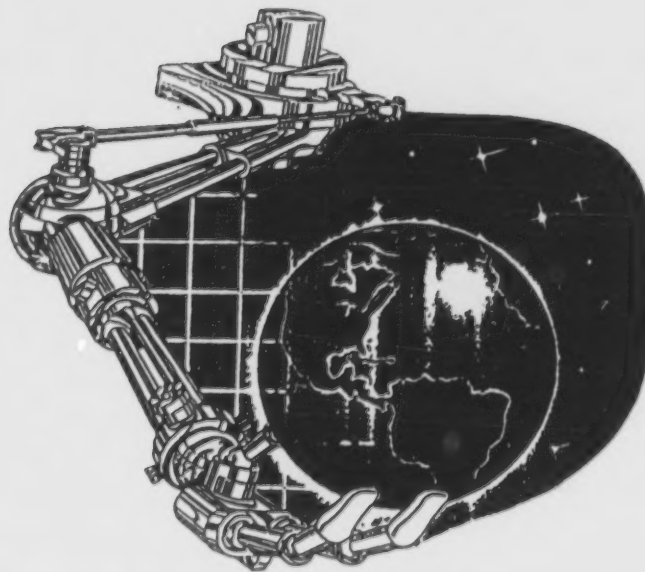
Funded under Program Improvement authorized by the
Carl D. Perkins Vocational Education Act

CC 057 734

TECHNOLOGY EDU-CAMP

1988

ELECTRONICS AND
COMPUTER AIDED DRAFTING AND DESIGN



ADJUNCTIVE REPORT
for the
PROGRAM IMPROVEMENT ADMINISTRATOR

Accompanying this adjunctive report is the final report now being disseminated in accordance with the project proposal.

Included within this adjunctive report is the complete and detailed budget to date, attendance records, and a copy of a news article which appeared in the local newspaper.

As stated in the final report, we feel that the project was an extreme overall success. However, due to the time factors involved, many instructors received the announcements too late for their own participation, but have expressed interest in future Edu-Camps. Also, most of the participants are asking for additional Edu-Camps.

In recognition of these high levels of interest, and of the amounts remaining in the budget, we would hope to extend the project to include another Technology Edu-Camp in Electronics and Computer Aided Drafting and Design.

Since materials and supplies were purchased in anticipation of forty participants, and only ten were used, a repeat of the Electronics and CADD Edu-Camp would be economically sound.

With the remaining \$5,706.65 (over half of the original amount requested), the Wilbur D. Mills Education Service Cooperative and the Arkansas State Technical Institute would like to offer the proposed additional Technology Edu-Camp in Electronics and Computer Aided Drafting and Design in June of 1989. It is felt that participation will be at its maximum with the advanced notice and high interest created by the 1988 Edu-Camp.

A major follow-up report would not be necessary for dissemination as was with the first Edu-Camp. However, additional TLA's would be written and copies prepared and presented to the Program Improvement Administrator. Other reproduction and dissemination costs would include printing and mailing of an attractive brochure for announcement and registration purposes. Therefore, redistribution of the remaining \$5,706.65 would need to be as follows:

Travel	\$5,160.00
Supplies	230.00
Instructional Materials	116.65
Reproduction and Dissemination	200.00
TOTAL REMAINING	\$5,706.65

TECHNOLOGY EDU-CAMP
1988

BUDGET

TITLE: Technology Edu-Camp in Electronics and
Computer Aided Drafting and Design

PROJECT DURATION: July 1, 1988 - September 30, 1988

APPLICANT: Wilbur D. Mills Education Service Cooperative
Beebe, Arkansas
(and Arkansas State Technical Institute)

Budget Categories	Funds Requested	Local Contribution
A. Personnel		
(1) Project Director 2 @ Full Time for 3 Weeks (incl. 40hrs planning and two weeks program activity)	\$00,000.00	\$3,623.00
(2) Project Instructors 2 @ Full Time for 3 Weeks	000.00	4,096.00
(3) Clerical Assistance 40 hours @ \$7.00 per hour	000.00	280.00
B. Employee Benefits		
(1) Social Security	000.00	566.00
(2) Retirement	000.00	239.00
(3) Unemployment and Worker's Compensation	000.00	7.00
(4) Insurance	000.00	110.00
C. Consultants	000.00	000.00
D. Travel (travel and per diem not to exceed state approved rate)		
(1) In district travel (incl. lodging & meals)	1,146.80	000.00
(2) Out-of-district travel	000.00	50.00
E. Maintenance and Operations Facilities & Utilities (10 days @ \$25/day)	000.00	250.00
F. Supplies and Materials		
(1) Office Supplies	340.59	200.00
(2) Instruction Materials	461.56	200.00
G. Reproduction and Dissemination (Reports, publications, etc.)	2,744.40	179.00
TOTAL	<u>\$4,693.35</u>	<u>\$9,800.00</u>
TOTAL PROJECT BUDGET	\$14,493.35	

TECHNOLOGY EDU-CAMP
ATTENDANCE ROSTER
JULY 18-29, 1988

NAME	SCHOOL	18	19	20	21	22	25	26	27	28	29
Janet Kariya	Bradford	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Helen McGee	Bradford	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Todd Rasmussen	Perryville	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Elvin Gordon Morgan	Perryville	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Walker Dunn	Ozarka - Melbourne	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Susan Lute	McCrory	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Willie Hunt	Lonoke	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Lonnie Johnston	No. Pulaski	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
David Langston	Foothills-Searcy	✓	✓	✓		✓	✓	✓	✓		✓
Randall James	WMC	✓	✓	✓	✓	✓	✓				✓

TECHNOLOGY EDU-CAMP
MILEAGE REIMBURSEMENT
JULY 18-29, 1988

NAME	BASE	1-WAY MILES	# OF TRIPS	TOTAL MILES	RATE	AMOUNT
Janet Kariya	Bradford	35	20	700	.10	70.00
Helen McGee	Bradford	35	20	700	.10	70.00
Todd Rasmussen	Perryville	60	20	1,200	.10	120.00
Elvin Gordon Morgan	Perryville	60	20	1,200	.10	120.00
Walker Dunn	Melbourne	93	20	1,860	.10	186.00
Susan Lute	McCrory	51	20	1,020	.10	102.00
Willie Hunt	Lonoke	22	20	440	.10	44.00
Lonnie Johnston	No. Pulaski	23	20	460	.10	46.00
David Langston	Searcy	18	16	288	.10	28.80
Randall James	WMC	N/A	N/A	N/A	N/A	N/A

NAME	SOC. SEC. NO.			TOTAL MILES	TOTAL AMOUNT	SIGNATURE
Janet Kariya	432	02	0448	700	70.00	Janet Kariya
Helen McGee	432	70	4479	700	70.00	Helen McGee
Todd Rasmussen	401	64	7707	1,200	120.00	Todd Rasmussen
Gordon Morgan	432	80	7447	1,200	120.00	Gordon Morgan
Walker Dunn	431	98	5339	1,860	186.00	Walker Dunn
Susan Lute	431	04	2359	1,020	102.00	Susan Lute
Willie Hunt	427	98	1656	440	44.00	Willie Hunt
Lonnie Johnston	430	74	1648	460	46.00	Lonnie Johnston
David Langston	432	64	1599	288	28.80	David Langston
Randall James	xxx	xx	xxxx	N/A	N/A	Randall James



At left- Mr. Howard King demonstrates the application of electronics in robots to his class.

Edu-Camp Held Recently at ASTI

A Technology Edu-Camp in Electronics and Computer Aided Drafting and Design was held July 18-29, 1988 at Arkansas State Technical Institute at Beebe.

The objective of this program improvement project is to initiate a Technology Edu-Camp program that will provide vocational instructors to upgrade their knowledge and understanding of, improve their competencies in, and develop lesson material and laboratory activities for specific technology areas responsive to current industry needs.

Field trips were arranged with industries in Searcy to enhance and support the training received. Instructors for the Camp were staff persons of the Arkansas State Technical Institute, and three (3) semester hours of graduate credit

were available from Arkansas State University, Jonesboro, if additional requirements were met.

It was hoped that through this program, Vocational Instructors were able to upgrade, improve, and expand their knowledge and expertise in the advancement of the technologies for which they are, or may become, responsible. And this program was very successful in recognizing the immediate need to offer local vocational instructors the opportunity for developing an awareness of the modern technologies found in today's industries; for acquiring an optimism and a genuine hope for improving themselves and their programs; for developing a range of competency skills from literacy to proficiency

in order to transmit those skills to their programs and their students; and for improving the overall status of and respect for vocational education in Arkansas.

Instructors for the Edu-Camp in Electronics were Mr. Howard E. King, and Dr. Jerry Coburn, both instructors for Arkansas State Technical Institute. Participants of the Technology Edu-Camp were vocational and related instructors of the 22 member districts of the Wilbur D. Mills Education Service Cooperative, and of other progressive technology related programs where space is available as determined by pre-registration.

This project is funded under Program Improvement authorized by the Carl D. Perkins Vocational Education Act.

nstrate this for you in her garden...chewchew...BIRTH-DAYS, ANNIVERSARIES & OTHER GOOD STUFF...Gene Campbell..W.H. Owen, Jr..Bernard & Dean Mash..Janice & Ronny Campbell..Clois Harrell..Edwin Fecher..Jim Fisher..Alvin Wheeler..Mark Armstrong..Ray Wisdom...Benny Hefner..Monty Harrell...Rusty Vines..Denise Cronk..Mark Cronk..Kathy Nokes..Todd Burrow..Louise England..Imogene & Marvin Fisher..Win-

ASTI Plastics Technology Program begins this Fall

BEEBE--The Arkansas State Technical Institute at ASU-Beebe recently leased the Huffaker Building in Beebe to expand its programs of instruction. ASTI has located its Plastics Technology center in the 7,000-square-foot building and, beginning with the fall semester

operator, setup man, and technician. This will provide experience and motivation from on-the-job training.

During the sophomore year, students will study mold design, extrusion, electricity and electronics, plastics properties and testing, quality control a production simulation

BEST COPY AVAILABLE

TECHNOLOGY EDU-CAMP
1988

Project Directors

Randall James
Voc. Support Service Coord.
Wilbur D. Mills Education
Service Cooperative
Dr. Tommy Venters, Director

Larry Haile
Assistant Director
Arkansas State Technical
Institute
Dr. Donald Cain, Director

Participants

Janet Kariya
Helen McGee
Willie Hunt
Susan Lute
Walker Dunn
Lonnie Johnston
Gordon Morgan
Todd Rasmussen
David Langston

Bradford
Bradford
Lonoke
McCrory
Melbourne
North Pulaski
Perryville
Perryville
Searcy

TECHNOLOGY EDU-CAMP 1988

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TECHNOLOGY EDU-CAMP
1988

Technology Edu-Camp 1988 was a pilot project by the Wilbur D. Mills Education Service Cooperative and the Arkansas State Technical Institute to provide vocational instructors an opportunity to upgrade their knowledge and understanding of specific technology areas in response to current industry needs. The first two areas to be included in the 1988 Edu-Camp were Electronics and Computer Aided Drafting and Design. As most secondary technology related programs are presently deficient of suitable laboratory activities, it was also intended that the participants would develop laboratory activities for these two areas as an integral part of the Edu-Camp. The results of these efforts are included in the appendix of this report. It is hoped that future Edu-Camps will be offered in other areas including Fluidics, Robotics, Plastics Technology, and Laser Technology.

The Technology Edu-Camp 1988 utilized the facilities, state-of-the-art equipment, and instructional expertise of the Arkansas State Technical Institute, (ASTI) and other resources available through nearby industries, as well as through the Wilbur D. Mills Education Service Cooperative's Vocational Assessment Resource Center. The Electronics portion was taught by Mr. Howard E. King, Associate Professor of Electronics for ASTI. The Computer Aided Drafting and Design (CADD) portion was taught by Dr. Jerry Coburn, Associate Professor of CADD for ASTI.

Participants in the program were given ten (10) full days of hands-on experience with microcomputers, CADD software with engineering applications, and modern Electronic measurement and application theory and devices, including an on-site visit to Vickers, Inc. in Searcy, a modern local industry where these programs are applied to manufacturing.

The Technology Edu-Camp was open to all vocational and related personnel involved in progressive technology related programs throughout Arkansas. The program was funded under Program Improvement authorized by the Carl D. Perkins Vocational Education Act. Enrollment was limited to forty (40) participants and approximately 400 announcements were sent out to local instructors, superintendents, and cooperative directors and vocational personnel throughout the state, as well as to State Department personnel. However, due to the rapidity of the project, only nine (9) were able to take advantage of the initial opportunity. The "Management Plan" is included in the appendix.

Although the turnout was understandably less than we had hoped, the success of the program was nonetheless greater than we anticipated. All participants delivered a laboratory activity for each of the two areas, and all were well presented in more detail than was expected. Based upon the pre-test and post-test results, the average increase in technological knowledge was 100 percent. Participants are requesting additional Edu-Camps in these and other areas. Some of the participants obtained graduate credit for the program and are now enlisting in a related graduate degree program. A summary of the participants' comments are included in the appendix. There have also been many requests for this Edu-Camp to be repeated for those who were unable to take advantage of it this time.

It is felt that these Technology Edu-Camp experiences were an assistance to the local district vocational teachers in their personal growth through technological awareness, literacy, and competency that can now be integrated into the curriculum at the local level in order to make their programs more responsive to the needs of the students, and the students' training more responsive to the needs of the area businesses and industries.

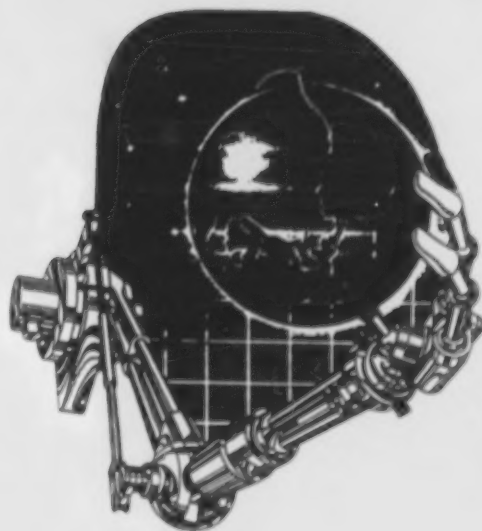
APPENDIX

TECHNOLOGY

EDU-CAMP

1988

ANNOUNCING



TECHNOLOGY
EDU-CAMP

July 18 - July 29

1988

ARKANSAS STATE TECHNICAL INSTITUTE
P. O. Drawer H
Beebe, Arkansas 72012

Technical Education - it works!

REGISTRATION FORM

Technology Edu-Camp in Electronics and Computer Aided Drafting and Design
July 18 - 29, 1988

Name _____ School _____

Position _____ Phone Numbers _____

Address _____

Please detach and mail by June 27 to:
Randall James, Coordinator
Vocational Support Services
Wilbur D. Mills Education Service Cooperative
P.O. Drawer 1016
Beebe, AR 72012 Phone: 882-6745

Please indicate if you plan to receive
credit for this camp: ☐ yes ☐ no

Please indicate if you desire campus
housing: ☐ yes ☐ no

TECHNOLOGY EDU-CAMP

in Electronics and
Computer Aided Drafting and Design

Sponsored by the Wilbur D. Mills Education Service Cooperative and the Arkansas State Technical Institute.

WILL BE HELD AT:
Arkansas State University - Beebe

This camp experience will provide you the opportunity for hands-on activities, designed to upgrade your knowledge and understanding of, improve your competencies in, and develop lesson material and laboratory activities for Electronics and Computer Aided Drafting and Design.

NO PREVIOUS EXPERIENCE WITH DRAFTING, COMPUTERS OR ELECTRONICS IS REQUIRED.



The Electronics phase of the Edu-Camp will include an overview of electronics, its effect on the consumer and its relationship to the information society and to manufacturing. Participants will learn the ease of using a programmable logic controller and how a computer may be connected to an external environment and exert control over that environment. Activities will include hands-on learning experiences, field-trip, and others to provide the participant with knowledge and materials that can be taken back to the classroom.

The CADD phase of the Edu-Camp will include an overview of Computer Aided Drafting and Design, its relationship to manufacturing, and its influence on the design of consumer products. Participants will learn the basics of micro computer use, from turning the equipment on to drawing, saving, and using special features. Hands-on activities will lead the participants through awareness and literacy to competency and proficiency in order to transmit those skills to their own classroom students.

The TECHNOLOGY EDU-CAMP will be open to all vocational and related personnel in the local districts of the Wilbur D. Mills Education Service Cooperative, and other instructors involved in progressive technology related programs.

Enrollment will be limited to 40 participants.

The training site will be in TEC 2 and TEC 3 buildings of the Arkansas State Technical Institute, located on the campus of Arkansas State University - Beebe.

Class time will be from 8:30 a.m. to 4:00 p.m. with breaks provided. The laboratories will be open during evening hours for extra hands-on practice. Field trips have been arranged to enhance and support the training received. Social and recreational activities will be planned for proper stress management during free time.

Instructors will be staff persons of the Arkansas State Technical Institute, and three (3) semester hours of graduate credit may be earned from Arkansas State University, Jonesboro, if additional requirements are met.

A grant will provide room and board for those who desire to stay on campus. Mileage and meals will be provided for those who prefer to commute.

TECHNOLOGY EDU-CAMP 1988

MANAGEMENT PLAN

<u>DATE(S)</u>	<u>ACTIVITY</u>
April 14, 1988	Initial meeting of WDMESC and ASTI to discuss need and possible solution.
April 19, 1988	Presentation of ideas before Vocational Support Service Committee.
April 26, 1988	Present Letter of intent to Coordinator of Planning and Development
April 28, 1988	Meeting of proposed project directors to further discuss potential of project.
May 6, 1988	Meeting of proposed project directors to identify specific goals and objectives, to establish basic framework, and to begin writing the proposal.
May 10, 1988 A.M.	Proposed project directors meet to review rough draft of proposal.
May 10, 1988 P.M.	Produce final copies of proposal.
May 11, 1988 A.M.	Deliver proposal copies to Coordinator of Planning and Development
May 12 - May 31, 1988	Develop brochure. Seek advance approval.
June 1 - June 3, 1988	Print and distribute brochures.

June 6 - July 1, 1988	Fine-tune Technology Edu-Camp activities.
July 5 - July 8, 1988	Finalize preregistration
July 11 - July 15, 1988	Make final preparation for Technology Edu-Camp.
July 18 - July 29, 1988	Technology Edu-Camp.
August 1 - August 31, 1988	Organize and write follow-up report.
September 1 - September 30, 1988	Publish and disseminate follow-up report.

TECHNOLOGY EDU-CAMP
1988

BUDGET

TITLE: Technology Edu-Camp in Electronics and
Computer Aided Drafting and Design

PROJECT DURATION: July 1, 1988 - September 30, 1988

APPLICANT: Wilbur D. Mills Education Service Cooperative
Beebe, Arkansas
(and Arkansas State Technical Institute)

Budget Categories	Funds Requested	Local Contribution
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(1) Social Security	000.00	566.00
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(3) Unemployment and Worker's Compensation	000.00	7.00
(4) Insurance	000.00	110.00
C. Consultants	000.00	000.00
D. Travel (travel and per diem not to exceed state approved rate)		
(1) In district travel (incl. lodging & meals)	1,146.80	000.00
(2) Out-of-district travel	000.00	50.00
E. Maintenance and Operations Facilities & Utilities (10 days @ \$25/day)	000.00	250.00
F. Supplies and Materials		
(1) Office Supplies	340.59	200.00
(2) Instruction Materials	461.56	200.00
G. Reproduction and Dissemination (Reports, publications, etc.)	2,744.40	179.00
TOTAL	\$4,693.35	\$9,800.00
TOTAL PROJECT BUDGET	\$14,493.35	

TECHNOLOGY EDU-CAMP
SCHEDULE
July 18 - 29, 1988

MONDAY (July 18)

8:00 - 8:30 Coffee & Doughnuts
8:30 - 9:15 Orientation, Welcome, and Pre-Test
9:15 - 10:15 CADD
10:15 - 10:30 Break
10:30 - 11:20 CADD
11:20 - 12:30 Lunch
12:30 - 2:00 CADD
2:00 - 2:15 Break
2:15 - 4:00 CADD

TUESDAY - THURSDAY (July 19 - 21)

8:30 - 10:00 CADD
10:00 - 10:15 Break
10:15 - 11:20 CADD
11:20 - 12:30 Lunch
12:30 - 2:00 CADD
2:00 - 2:15 Break
2:15 - 4:00 CADD

FRIDAY (July 22)

8:30 - 11:20 CADD-CAM Demonstration
by Mr. Dick McManus, Light Machines Co.
11:20 - 12:30 Lunch
12:30 - 2:15 Curriculum Writing
2:15 - 2:30 Break
2:30 - 4:00 CADD

MONDAY - TUESDAY (July 25 - 26)

8:30 - 10:00 Electronics
10:00 - 10:15 Break
10:15 - 11:20 Electronics
11:20 - 12:30 Lunch
12:30 - 2:00 Electronics
2:00 - 2:15 Break
2:15 - 4:00 Electronics

WEDNESDAY (July 27)

8:30 - 11:30 Field Trip to Vickers
11:30 - 12:30 Lunch
12:30 - 2:00 Electronics
2:00 - 2:15 Break
2:15 - 4:00 Electronics

THURSDAY (July 28)

8:30 - 10:00 Electronics
10:00 - 10:15 Break
10:15 - 11:20 Electronics
11:20 - 12:30 Lunch
12:30 - 2:00 Electronics
2:00 - 2:15 Break
2:15 - 4:00 Electronics

FRIDAY (July 29)

8:30 - 10:00 Electronics
10:00 - 10:15 Break
10:15 - 11:20 Electronics
11:20 - 12:30 Lunch
12:30 - 2:15 Curriculum Writing
2:15 - 2:30 Break
2:30 - 4:00 Program Evaluation, Post-Test, & Wrap-Up

TECHNOLOGY EDU-CAMP
PROGRAM OF ACTIVITIES

FIRST WEEK: COMPUTER AIDED DRAFTING AND DESIGN (CADD)

JULY 18

1. Introduction to Main Menu
2. Lines
3. Now You See It
4. Methods of Entering Lines
5. Grabbing Points
6. Special Features

JULY 19

1. Drawing Aids
2. Altering Entities
3. Moving and Duplicating Objects
4. Magnifying Glass (Use of Zoom and Regen Commands)

JULY 20

1. Placing Notes and Specifications
2. Preparing for a New Drawing
3. Field Trip to Vickers, Inc. at Searcy

JULY 21

1. Layering Your Drawings
2. Dimensioning
3. Applying Hatch and Sketch Commands

JULY 22

1. From Display to Paper
2. Isometrics
3. Curriculum Material Development

SECOND WEEK: ELECTRONICS - CIM

JULY 25

1. Overview of Electronics
 - a. Effect on Consumer
 - b. Relationship to the Information Society
 - c. Relationship to Manufacturing
2. Programmable Logic Controller (PLC)
 - a. Purpose of the PLC

- b. Laboratory Experience
 - (1) Write a Ladder Logic Program
 - (2) Enter Program into a PLC
 - (3) Run the Program

JULY 26

- 1. Building Blocks for a Computer
 - a. Logic Functions and Gates
 - b. Boolean Algebra
 - c. Base 2 Math
 - d. Base 16 Math
- 2. Laboratory Experience: Construct Logic Circuits to Verify Boolean Equations

JULY 27

- 1. Computer Process Control
 - a. External Connections
 - (1) Sensors
 - (2) Solenoids
 - (3) ADC and DAC
 - b. Internal Connections
 - (1) ROM
 - (2) RAM
 - (3) PIA
- 2. Laboratory Experience: Field Trip to AT&T

JULY 28

- 1. Electrical Motors
 - a. DC
 - b. AC Single Phase
 - c. AC Poly Phase
 - d. Stepping
- 2. Laboratory Experience: Stepping Motor Controls

JULY 29

- 1. Discrete Components
 - a. Linear, Passive Components
 - b. Active Devices
 - (1) Diodes
 - (2) Transistors
 - (3) Thyristers
- 2. Laboratory Experience
 - a. Draw a Schematic to Use as SCR to Control a Lightbulb
 - b. Build This Circuit and Make It Work
- 3. Curriculum Material Development

COURSE NAME: Technology Awareness in Electronics and Computer Aided Drafting and Design Technologies.

SEMESTER HOURS: 3 (Sixty Contact Hours)

COURSE DESCRIPTION: This course is to provide secondary vocational instructors an opportunity to upgrade their knowledge and understanding of, improve their competency in, and develop lesson material and laboratory activities for Electronic and Computer Aided Drafting Technologies. This will be accomplished by providing students the opportunity for hands-on laboratory experiences as well as special field trips to industry. No prerequisite required.

PARTICIPANTS: This course is directed toward all vocational teachers (no previous experience with micro computers or CADD software and/or Electronics needed). This will give them a better perspective of how CADD and Electronics might be applied in the various fields of work.

TEXT: Instructor Handout Materials

VISUAL AIDS:

1. Overhead Projector
2. Instructor's Examples
3. Electronic Lab Equipment
4. CADD Lab Equipment

COURSE OUTLINE:

I. CADD PHASE UNITS AND OBJECTIVES

- | | |
|---|---|
| <p>A. Overview of Computer Aided Drafting and Design</p> <ol style="list-style-type: none">1. Relationship to manufacturing2. Influence on design of consumer products | <p>Make students aware of the influence made on our society by such technologies as CADD.</p> |
| <p>B. Introducing the Student to the MicroComputer</p> <ol style="list-style-type: none">1. Turn on-off2. How to save drawings | <p>To ease any fears older adults sometime have toward computers.</p> |
| <p>C. Introduction Main Menu</p> | <p>Apply the END, ENDSV, and QUIT commands.</p> |
| <p>D. Lines</p> | <p>Draw LINES, CIRCLES, ARCS, DRAGMODE commands.</p> |
| <p>E. Now You See It</p> | <p>ERASE, REDRAW, OOPS and HELP commands.</p> |

UNITS	OBJECTIVES
F. Methods of Entering Lines	Draw polygons of specific lengths and angles.
G. Grabbing Points	Apply OBJECT, SNAP, and APERTURE commands.
H. Special Features	Coordinate DISPLAY, ORTHOGRAPHIC and PRINTER ECHOING.
I. Drawing Aids	Apply the GRID, AXIS, and SNAP commands.
J. Altering Entities	Practice the CHAMFER, BREAK and FILLET commands.
K. Moving and Duplicating Objects	CHANGE, MOVE, COPY and MIRROR objects.
L. Magnifying Glass	Use the ZOOM and REGEN commands.
M. Placing Notes and Specifications	Apply the use of TEXT, STYLE, and Q-TEXT.
N. Preparing for a New Drawing	Apply and practice the use of units, limits, status and prototype drawings.
O. Layering Your Drawings	Creating new layers, changing the current layer, assigning colors, drawing on layers, turning layers off and on.
P. Dimensioning	Dimensioning horizontal lines, vertical lines, inclined lines, circles, angles.
Q. Dressing Your Drawings	Apply the HATCH and SKETCH commands.
R. From Display to Paper	Fast plot, customized plot, printer plot.
S. Isometrics	Apply the SNAP and ISOPLANE commands.
T. Curriculum Material Development	Help prepare the teachers to take the knowledge acquired back to their classrooms.

COURSE OUTLINE:

II. ELECTRONICS PHASE UNITS AND OBJECTIVES

- | | |
|---|--|
| A. Overview of Electronics <ol style="list-style-type: none">1. Effect on consumer2. Relationship to the information society3. Relationship to manufacturing | Make the participant aware of the pervasive influence of electronics in our society. |
| B. Programmable Logic Controller (PLC) <ol style="list-style-type: none">1. Purpose for the PLC2. Laboratory experience<ol style="list-style-type: none">a. Write a ladder logic programb. Enter the program in a PLCc. Run the program | Give the students an appreciation of the power, versatility, and ease of use of a programmable logic controller. |
| C. Building Blocks of a Computer <ol style="list-style-type: none">1. Logic Functions and Gates2. Boolean Algebra3. Base 2 Math4. Base 16 Math | Discuss how problems may be couched in terms of Boolean Algebra, these equations solved by hardware logic gates, and the results interpreted in terms desired by operator. |
| D. Laboratory Experience <ol style="list-style-type: none">1. Construct Logic Circuits to verify Boolean equations | Demonstrate this by building and using the appropriate circuits. |
| E. Computer Process Control <ol style="list-style-type: none">1. External Connections<ol style="list-style-type: none">a. Sensorsb. Solenoidsc. ADC and DAC2. Internal Connections<ol style="list-style-type: none">a. ROMb. RAMc. PIA | Show how a computer may be connected to an external environment and exert control over that environment. |
| F. Laboratory Experience:
Field Trip to AT&T | Observe use of soft automation in industry. |
| G. Electrical Motors <ol style="list-style-type: none">1. DC2. AC single phase3. AC polyphase4. Stepping | Make the participant aware of a method of energy conversion. |
| H. Laboratory Experience:
Stepping Motor Controls | Determine how a stepping motor is controlled. |

UNITS

OBJECTIVES

I. Discrete Components

1. Linear, passive components
2. Active Devices
 - a. Diodes
 - b. Transistors
 - c. Thyristors

Give the student an appreciation of the mathematical skills needed to design and troubleshoot electronic circuits.

J. Laboratory Experience:

1. Draw a schematic to use a SCR to control a lightbulb
2. Build this circuit and make it work

Demonstrate how a simple circuit can be used to teach a complex idea.

K. Curriculum Material Development

Help prepare the teachers to take the knowledge acquired back to their classrooms.

EVALUATION:

1. 60% of grade will be for laboratory work.
2. 40% of grade will be determined by examination.
3. Attendance and lab participation are mandatory.
4. Letter grades for transcripts are determined as follows:

91-100 = A
81-90 = B
71-80 = C
61-70 = D
0 -60 = F

TECHNOLOGY EDU-CAMP 1988
PRE-TEST -- POST-TEST COMPARISONS

PARTICIPANT	PRE-TEST	POST-TEST	POSSIBLE	% INCREASE
1	25	39	40	56
2	22	37	40	68
3	22	33	40	50
4	19	39	40	105
5	19	38	40	100
6	18	37	40	106
7	17	38	40	124
8	16	37	40	131
9	15	36	40	140
10	13	29	40	123
AVERAGE PERCENT INCREASE				100%

TECHNOLOGY EDU-CAMP 1988

PARTICIPANT COMMENTS

Nine out of ten participants rated the Edu-Camp as "Excellent" and one rated it "Good." Comments included were as follows:

"Have more camps such as this."

"The best one I have ever attended. The instructors were tops."

"Offer a second year Edu-Camp."

"Hands-on experience was most helpful."

"Having no knowledge of computers prior to this camp, I have been made more appreciative of the world of electronics, and the AutoCADD was most helpful."

"Very informative; the instructors were fresh and exciting."

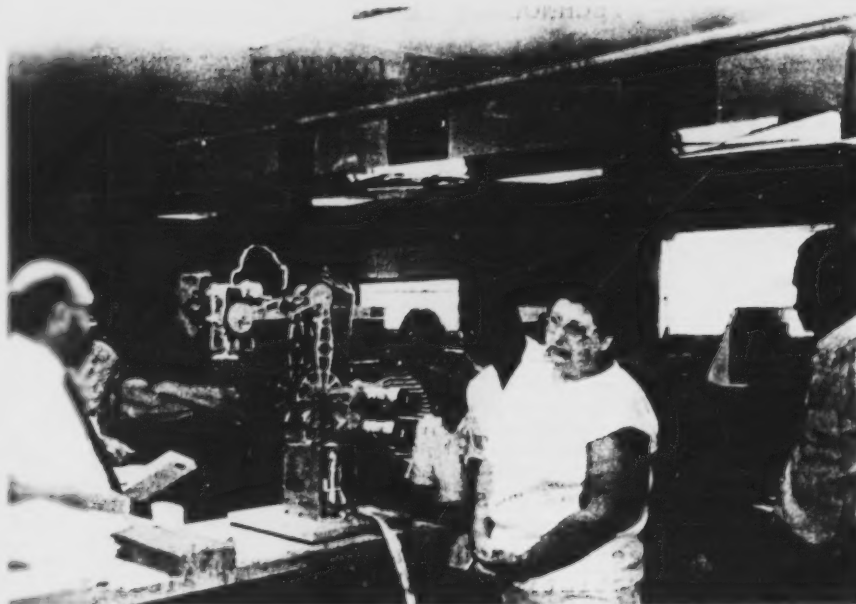
"I appreciate having such a workshop available."

"I highly recommend this program to all teachers and counselors."

"I thought it was challenging and the instructors gave great individual help."

"Excellent hands-on experience I could not have gotten anywhere else. Thanks."

1988



Mr. Howard King demonstrates the Rhino Model XR-3 robot to the Technology Edu-Camp participants.



Dr. Jerry Coburn demonstrates isometric and engineering drawings using the AutoCADD® Release 9 software on NEL 286 equipment as Edu-Camp participants look on.

TECHNOLOGY EDU-CAMP
1988



Mr. Willie Hunt uses teach-pendant to program the Rhino Model XR-3 robot to perform a series of task movements.



Mr. Walker Dunn observes Mr. King as he explains the fundamental operations of robots and their applications to industry.

TECHNOLOGY EDU-CAMP
1988



Mr. Lonnie Johnston explores truth table functions of the TTL logic chips.

BEST COPY AVAILABLE

LABORATORY

ACTIVITY

PACKETS

for

COMPUTER AIDED

DRAFTING AND DESIGN

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Equipment Terms and Definitions

CONDITIONS PROVIDED:

CAD terms, Definitions, Computer, Monitor, Digitizer,
and Printer

PERFORMANCE OBJECTIVES:

1. The students will learn terms and definitions.
2. The students will be able to match definitions with terms.
3. Students will be able to identify terms with equipment.

SUCCESS CRITERIA:

1. Match CAD terms with Definition Matching Quiz.
2. Identify equipment with proper name.
3. Explain what each piece of equipment does.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Equipment Terms and Definitions

"NEED-TO-KNOW" INFORMATION:

This is just a course awareness lesson on computers and the terms and definitions used. Students do not have to have any experience in computers. The only thing that's required is that you be eager to learn new terms and have an open and relaxed mind.

All handouts and equipment will be made available. We must realize that computers are playing a big part in our society now and will play even a greater role in the future.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Equipment Terms and Definitions

TOOLS AND EQUIPMENT:

Computer, Monitor, Digitizer Pad with Mouse, Printer,
AutoCAD Software Program.

MATERIALS:

Paper

NOTE: Students will receive handouts with all needed
information plus some extra literature for
parents concerning computers.

TASK PROCEDURE:

1. Tour computer room.
2. Instructor explains computers place in society.
3. Pass out hand-out sheets.
4. Pass out CAD terms and pronounce them.
5. Pass out definitions and read them (on a separate
sheet from terms).
6. Students rewrite, or list terms.
7. Explain and match terms with computer components or
parts. (Identify)
8. Students will break up in groups and see how many
terms they can match with definitions.
9. Written test.

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Equipment Terms and Definitions

QUIZ:

- | | | |
|----------|---|-----------------------|
| _____ a. | Process system used in designing industrial drawings with the aide of the computer and its related input and output devices. | 1. Keyboard console |
| _____ b. | A TV like display that can be a storage tube. plasma display, or refresh tube display. | 2. Line printer |
| _____ c. | An electronic information-handling machine capable of performing arithmetical calculations and making logical decisions under the control of programs. | 3. Computer |
| _____ d. | The part of a computer system containing the system's arithmetic, logic, primary storage, and controls of input and output peripheral devices. | 4. Free-moving cursor |
| _____ e. | Various devices that are used in the CAD system in which data is input, stored, retrieved, and output from the CPU. | 5. Plotter |
| _____ f. | small, Inexpensive computer that has a CPU and one or more input/output devices. | 6. Flexible disk |
| _____ g. | A input device, consisting of ASCII character keys, numeric keys, and math function key pad used by the computer operator before, during, and after running programs. | 7. Joy stick |
| | | 8. Micro-computer |
| | | 9. Cathode ray tube |
| | | 10. Stylus |
| | | 11. Hard copier |
| | | 12. Magnetic tape |
| | | 13. Light pen |
| | | 14. Manual digitizer |

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Equipment Terms and Definitions

QUIZ: (Continued)

- | | | | |
|----------|---|-----|-------------------------|
| _____ h. | An X-Y type output device, usually drum or bed form, that produces line drawings on paper with a pen controlled by instructions from CPU or tape controller. | 15. | Digitizer tablet |
| _____ i. | An input device where digit or X-Y points are located by positioning the free-moving cursor or stylus on an electromagnetic grid embedded in the digitized board. | 16. | Computer-aided drafting |
| _____ j. | Contains a sensing coil connected to the digitizer control used for sighting a drawing coordinate X-Y points on the digitizer. | 17. | Peripheral devices |
| _____ k. | Used to locate coded programs of X-Y points by pressing at the point of drawing line intersect on digitizer board and to CRT. | 18. | Central processing unit |
| _____ l. | An input device using stored graphic symbols in the CPU where a designer uses a light pen, stylus, or free-moving cursor by positioning on tablet for each symbol to create a drawing on CRT. | 19. | Automated digitizer |
| _____ m. | A input device used with a refreshed-picture display to create various edges, contours, or other features in a photographic image. | | |

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Equipment Terms and Definitions

QUIZ: (continued)

- _____ n. Utilizes a television camera on an automated drafting machine to follow the line being digitized for output digits according to stored information in CPU.
- _____ o. An output device that prints one line at a time from CPU.
- _____ p. An output device that forms graphic and character images by electronic signals on paper from CPU.
- _____ q. An oxide-coated plastic disk enclosed in a protective covering that can be used for storage of data.
- _____ r. Medium on which data is recorded in the form of magnetized spots on the surface of magnetically sensitive coated tape.
- _____ s. Used as a graphic input and cursor positioning device to the CRT and CPU.

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Equipment Terms and Definitions

QUIZ ANSWERS:

A. 16	K. 10
B. 9	L. 15
C. 3	M. 13
D. 18	N. 19
E. 17	O. 2
F. 8	P. 11
G. 1	Q. 6
H. 5	R. 12
I. 14	S. 7
J. 4	

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Terminology

CONDITIONS PROVIDED:

1. Computer, Monitor, Digitizer, and Printer
2. "AutoCAD" Software
3. Students should have viewed components and watched a "AutoCAD" presentation
4. List of CAD Terminology.

PERFORMANCE OBJECTIVES:

1. Student will be able to match correct definitions with terminology.
2. Students will have a working knowledge of AutoCAD terminology.

SUCCESS CRITERIA:

1. Successful completion of test covering terminology.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Terminology

"NEED-TO-KNOW" INFORMATION:

CAD TERMINOLOGY AND DEFINITIONS

- A. Program - Step-by-step instruction which cause the computer to solve a problem.
- B. Computer Language - A set of mathematical commands such as add, divide, or multiply, or functional commands to "store in memory", "delete", or "draw".
- C. Beginners All-Purpose Symbolic Instruction Code (BASIC) - A symbolic English-like programming language.
- D. Graphics- computer output that is composed of lines rather than letters, numbers, or symbols.
- E. Cursor - Flashing rectangular dot or crosshair that indicates the current position on the screen.
- F. Digit - Any number from 0 through 9.
- G. Menu - Graphic symbols or information arranged in software to be retrieved at some time.
- H. Resolution - A measure of the number of separately addressable positions on the coordinate grid.

SYMBOLS OR WORDS AND DESCRIPTIONS

- A. Find - Position tape at beginning of desired file.
- B. Save - Causes the entire program currently in memory to be stored on disk.
- C. Draw - Produces a visible line between the last position of the cursor and the X-Y coordinates specified.
- D. Move - Allows moving cursor on the screen without making a line with X-Y coordinates specified.
- E. Rotate - Produces an angular displacement in the orientation of relative moves and draws.
- F. Window - Allows selecting whatever portion of user data space you want to see on the screen.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Terminology

"NEED-TO-KNOW" INFORMATION: (continued)

- G. F1 - Flip screen
- H. F6 - Coord on/off
- I. F7 - Grid on/off
- J. F8 - Ortho on/off
- K. F9 - Snap on/off
- L. F10 - Tablet on/off
- M. CTRL-H - Removes one character at a time
- N. CTRL-Y - Cancels all characters on the command line.
- O. CTRL-C - Cancels the current command and returns the command prompt
- P. CTRL-D - Toggles the screen coordinates display on/off.
- Q. CTRL-E - Toggles to the next isometric plane when in ISO mode.
- R. CTRL-G - Toggles Grid on/off
- S. CTRL-O - Toggles ORTHO on/off
- T. CTRL-T - Toggles SNAP on/off
- U. CTRL-T - Toggles tablet on/off
- V. CTRL-Q - Turns printer echo on/of

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Terminology

TOOLS AND EQUIPMENT:

Computer, Monitor, Digitizer, and Printer

MATERIALS:

1. Paper and Pen
2. Information Sheet

TASK PROCEDURE:

1. Review an AutoCAD procedure.
2. Study information sheet.

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Terminology

QUIZ:

FILL IN THE BLANK

1. _____ is a symbolic English-like program language.
2. _____ is a step-by-step instruction which causes the computer to solve a problem.
3. Computer output that is composed of lines rather than letters, numbers, or symbols is called _____.
4. Any number from 0 through 9 is a _____.
5. A _____ is a measure of the number of separately addressable positions on the coordinate grid.
6. A _____ is a set of mathematical commands such as add, divide, or multiply, or functional commands to "store in memory", "delete", or "draw".
7. A flashing rectangular dot or crosshair that indicates the current position on the screen is a _____.
8. _____ are graphic symbols or information arranged in software to be retrieved at some time.

MATCHING

- | | | |
|-------------|---|-------------|
| 9. _____ | Allows selecting whatever portion of data space you want to see on the screen. | A. Draw |
| 10. _____ | Grid on/off | B. Window |
| 11. _____ | Cancels the current command and returns the command prompt. | C. F7 |
| 12. _____ | Flip Screen | D. F1 |
| 13. _____ | Produces a visible line between the last position of the cursor and the X-Y coordinates specified | E. CTRL-C |
| 14. _____ | Toggles to the next isometric plane when in Iso mode. | F. CTRL-E |

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: CAD Terminology

QUIZ ANSWERS:

1. BASIC
2. Program
3. graphics
4. digit
5. resolution
6. computer language
7. cursor
8. menu
9. B
10. C
11. E
12. D
13. A
14. F

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Turn on System and Bring up AutoCAD

CONDITIONS PROVIDED:

1. Computer, Monitor, Digitizer with Mouse
2. AutoCAD Software installed on hard disk.

PERFORMANCE OBJECTIVES:

1. The student will turn on system.
2. The student will get into AutoCAD directory.
3. The student will load AutoCAD.
4. The student will run AutoCAD.

SUCCESS CRITERIA:

1. System is booted up.
2. System is in AutoCAD Directory.
3. AutoCAD Main Menu is on screen.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Turn on System and Bring up AutoCAD

"NEED-TO-KNOW" INFORMATION:

AutoCAD is an extremely powerful graphics Program. In order to run it you will need to have the program installed on a hard drive.

The programs on the hard drive will be placed in what we term "directories". Each of these directories can be accessed individually by doing what we call changing directories.

The hard drive is normally designated as drive "C:>". To get from one directory to another it is necessary to use the command "C:>/(Filename) enter. This is what you are about to attempt.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Turn on System and Bring up AutoCAD

TOOLS AND EQUIPMENT:

Computer, Monitor, Digitizer with mouse and AutoCAD
installed on Hard Drive.

MATERIALS:

Paper and pencil for notes.

- NOTE: 1. "↵" means to tap the enter or return key.
2. Any information enclosed in quotations ""
is to typed into the computer from the
keyboard.

TASK PROCEDURE:

1. Turn on power to monitor and CPU unit.
2. At the C:> enter "CD/ACAD " ↵".
3. At this point you should see C:> or
C:ACAD> in the upper right hand corner of your
screen.
4. Type "ACAD ↵".
5. At this point you should get the AutoCAD Main Menu.

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Turn on System and Bring up "AutoCAD"

QUIZ:

1. What three pieces of hardware are needed to run "AutoCAD"?
2. AutoCAD is what type of program?
3. List in order the steps to running AutoCAD beginning with start up?

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Turn on System and Bring up "AutoCAD"

QUIZ ANSWERS:

1. Computer, Monitor, Digitizer with mouse
2. Graphics
3. (a) Turn on power to computer and monitor.
(b) Change directories to the Acad.Dir
(c) Type in ACAD and enter.

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drawing

LAB ACTIVITY TITLE: Layers

CONDITIONS PROVIDED:

1. Computer, Monitor, and Printer
2. AutoCAD Software
3. Instructions on beginning a new drawing

PERFORMANCE OBJECTIVES:

1. Type commands from keyboard.
2. Set Up - New - Layer/s
3. Set the Color for each Layer/s
4. Set the Linetype for each layer/s
5. Check and see if all Layers are set up
6. Set needed layer and begin drawing

SUCCESS CRITERIA:

1. Completion of layer set up
2. Accuracy of layer set up
3. Instructor approval

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drawing

LAB ACTIVITY TITLE: Layers

"NEED-TO-KNOW" INFORMATION:

When drawing objects that are detailed or complicated, the different parts must be drawn on different sheets of paper. This gives a completed drawing that has good organization, easy to read, and neat in appearance. Think of the different parts of a house plan that is drawn on the different sheets of paper.

When drawing on the drafting table to change from one sheet to another, one sheet is untaped from the table top and another sheet is taped in its place and drawing is continued.

The computer aided drafting program provides this same type of drawing capability with the "Layer Command". By using the layer command, a stack of layers are developed and this is in reality, your sheets of paper. A change from one layer to another can be made at anytime it is needed.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Computer Aided Drawing

LAB ACTIVITY TITLE: Layers

TOOLS AND EQUIPMENT:

Computer, Monitor, Computer Software, Printer and Paper

MATERIALS:

Paper

NOTE: "And Return" means to press the Enter Key to enter the information into the computer.

TASK PROCEDURE:

Begin New Drawing

1. From "Main Menu" choose the number 1 key, press the key, and Return.
2. Type in "Prob-L" and Return.

Create Layers

1. Look at the bottom of the screen and you will see the word "Command".
2. Type the word "Layer" and Return.
3. Type "N" or "New" and Return.
4. Type "Border, Visible, Dimen, Title" and Return.
5. Type "C" and Return.
6. Type "Red" and Return.
7. Type "border" and Return.
8. Type "C" and Return.
9. Type "Blue" and Return.
10. Type "Visible" and Return.
11. Type "C" and Return.
12. Type "Green" and Return.
13. Type "Dimen" and Return.
14. Type "C" and Return.
15. Type "Cyan" and Return.
16. Type "Title" and Return.
17. Type "L" and Return.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE:

LAB ACTIVITY TITLE:

TASK PROCEDURE: (continued)

18. Type "continuous" and Return.
19. Type "Border, Visible, Dimen, Title" and return.
20. Type "?" and Return.
21. Return -- The screen will change and show a listing of all the layers, colors, and linetypes entered into the computer.
22. Have the instructor check your work.
23. Press the "F1" Key to return to the Drawing Screen.
24. Type "S" or "Set" and Return.
25. Type "Border" and Return.
26. Return
27. Look at the status line at the top left of the screen for "Layer Border".
28. Complete setup for you drawing.

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Computer Aided Drawing

LAB ACTIVITY TITLE: Layers

QUIZ:

1. On what layer is your current drawing being recorded?
2. How would you obtain a listing of the named layers?
3. How do you get back to the drawing screen from the layers listings?
4. How many linetypes may be used on any one layer?
5. How can you tell what is your current or set layer?

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Computer Aided Drawing

LAB ACTIVITY TITLE: Layers

QUIZ ANSWERS:

1. The set layer
2. Type "?" at the command and return twice.
3. Press "F1".
4. One
5. Listed at upper left of the screen.

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Border with Titles

CONDITIONS PROVIDED:

1. Computer, Monitor, Digitizer, and Printer
2. "AutoCAD" Software
3. Prerequisite ability to turn computer on and obtain AutoCAD Menu, or provision of the same.
4. Setup has been completed except the layers and colors for title and border.
5. Printing has been taught.

PERFORMANCE OBJECTIVES:

1. The student will draw horizontal and vertical lines to form a border.
2. The student will write text in boxes.

SUCCESS CRITERIA:

1. Completion of border and text.
2. Accuracy of the color selected for each.
3. Accuracy of the lines and text.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Border with Titles

"NEED-TO-KNOW" INFORMATION:

The two layers are to be done in two different colors. The border is the first layer to be selected, followed by title. The student may select any two colors listed on the AutoCAD Menu.

Horizontal means across. Vertical means up and down.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Border with Titles

TOOLS AND EQUIPMENT:

Computer, Monitor, Digitizer Pad with Mouse, Printer,
AutoCAD Software Program

MATERIALS:

Paper

NOTE: "Pick-1" means to tap the #1 on the digitizer
mouse.

TASK PROCEDURE:

1. "Pick-1" AutoCAD
2. "Pick-1" Layer
3. "Pick-1" New
4. Type in "Border, Title"; Enter
5. "Pick-1" Color
6. "Pick-1" the color selected for border
7. Type in "Border"; Enter
8. "Pick-1" Color
9. "Pick-1" the color selected for title
10. Enter
11. Enter
12. "Pick-1" Layer
13. "Pick-1" Set
14. Type in border; Enter;Enter
15. "Pick-1" Draw
16. "Pick-1" Line
17. Start on 3rd row from top of grid and move to first dot from the right side. "Pick-1" to activate line.
18. Draw horizontally to corresponding dot at left side. "Pick-1". "Pick-2". Move mouse to see if line has successfully been drawn.
19. Position cross lines at last point stopped. "Pick-2 to reactivate line. "Pick-1". Draw a vertical line to 3rd row from bottom of grid. "Pick-1"
20. Draw a horizontal line to corresponding dot on right side. "Pick-1".

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

TASK PROCEDURE: (continued)

21. "Pick-1" and draw a vertical line to join top horizontal line. "Pick-1". "Pick-2".
22. Line up cross lines with the lower left-hand corner. Move up three rows. "Pick-2", "Pick-1 and draw a horizontal line to the corresponding vertical line. "Pick-1". "Pick-2".
23. Divide the box just made into two equal parts by drawing a vertical line from horizontal line to horizontal line.
24. "Pick-1" Layer. "Pick-1" Set. Type in title. Enter. Enter.
25. "Pick-1 Draw. "Pick-1" Next. "Pick-1" Text. "Pick-1" Fit. Go to left-hand box and move in one space. Try to line up with vertical center of box. "Pick-1" and draw a horizontal line to one place from vertical line. "Pick-1". Type in First Name. Enter.
26. "Pick-1" Draw. "Pick-1 Next. "Pick-1" Text. "Pick-1" Fit. Move to right-hand box. Select vertical center. "Pick-1". Draw horizontal line. "Pick-1". Type in Last Name. Enter.
27. Print a copy.

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Drawing

CONDITIONS PROVIDED:

1. Computer, Monitor, Digitizer, Printer
2. "AutoCAD" Software

PERFORMANCE OBJECTIVES:

1. The student will construct a circle.
2. The student will construct a square.
3. The student will draw a square around a circle.

SUCCESS CRITERIA:

1. Completion of drawing.
2. Accuracy of measurements.
3. Neatness.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Drawing

"NEED-TO-KNOW" INFORMATION:

Prior to this activity a student must start a new program, set appropriate layers (border, square, circle), and draw a border.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Drawing

TOOLS AND EQUIPMENT:

Computer, Monitor, Digitizer Pad with Mouse, Printer,
AutoCAD Software Program

MATERIALS:

NOTE: Pick-1 means to tap the #1 on the digitizer mouse.
Pick-2 means to tap the #2 on the digitizer mouse.
Pick-1 on the AutoCAD means to move the mouse to highlight the AutoCAD command on the right side of the screen and Pick-1.

TASK PROCEDURE:

1. Call up previously constructed border.
2. Pick-1 on "AutoCAD".
3. Pick-1 on "Layers".
4. Pick-1 on "Set".
5. Type (Circle); Enter; Enter.
6. Pick-1 on "AutoCAD".
7. Pick-1 on "Draw".
8. Pick-1 on "Line".
9. Press F8 to remove ORTHO
10. Move cursor to upper right corner, Pick-1.
11. Move cursor diagonally to lower left corner; Pick-1.
12. Pick-1 on "Line".
13. Move cursor to upper left corner; Pick-1.
14. Move cursor diagonally to lower right corner; Pick-2.
15. Press F8 to return ORTHO.
16. Pick-1 on "Draw".
17. Pick-1 on "Circle".
18. Pick-1 on "Cen/Diam".
19. Press F9 to remove "Snap".
20. Pick-1 on center point.
21. Type (4); enter.
22. Pick-1 on "AutoCAD".
23. Pick-1 on "Layer".
24. Pick-1 on "Set".
25. Type (square); Enter; Enter.
26. Pick-1 on "Draw".
27. Pick-1 on "Line".

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

TASK PROCEDURE: (continued)

28. Move cursor so that crosshairs form tangent lines on the circle; Pick-1.
29. Repeat step 28 until a square is formed around the circle; Pick-2.
30. Pick-1 on "Edit".
31. Pick-1 on "Erase".
32. Pick-1 on first diagonal.
33. Pick-1; Pick-2 on second diagonal.
34. Send to printer.

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Multi-view (Two View)

CONDITIONS PROVIDED:

1. Computer, Monitor, Digitizer and Printer
2. AutoCAD Software
3. Prerequisite ability to turn computer on and obtain AutoCAD Menu

PERFORMANCE OBJECTIVES:

The students will be able to construct a two-view drawing using straight lines forming right angles. The students will be making a NEW drawing, setting layers, doing the border, title block, lettering and dimensioning.

SUCCESS CRITERIA:

The success will be completion of this drawing, accuracy of lines, balanced letters within title block.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Drawing Lines With a Pointing Device and
Lettering a Drawing

LAB ACTIVITY TITLE: Multi-view (Two View)

"NEED-TO-KNOW" INFORMATION:

A two-view drawing is a multi-view drawing showing TOP & FRONT, or FRONT & SIDE. The front view will be placed below the top or to the left of the side. This will be a choice for the students.

A reminder that the computer is a modern tool to use to aid drafting without manual use of a T-Square, triangles, and scale. This is an advantage for persons with handicaps or learning disabilities.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Drawing Lines With a Pointing Device and
Lettering a Drawing

LAB ACTIVITY TITLE: Multi-View (Two Views)

TOOLS AND EQUIPMENT:

Computer, Monitor, Digitizer, and Printer
AutoCAD Software

MATERIALS:

A Box of "Crackers" (empty of course!!)

TASK PROCEDURE: Using AutoCAD

Call up a drawing:

1. Type C - Enter
2. Type A - Enter

Visual on the screen should be "AutoCAD" MAIN MENU

To Assign Layers:

1. Highlight AutoCAD from the MAIN MENU; "Pick-1".
*Reminder: "Pick-1" means to tap the #1 on the
cursor or digitizer mouse.
2. A sub-menu should appear on the screen under AutoCAD
Highlight "LAYERS"; Pick-1; highlight "NEW"; Pick-1.
3. Type these words: "BORDER, TITLE, VISIBLE, HIDDEN,
CENTER, DIMENSION, NOTES"; ENTER.

To Assign Colors:

1. Highlight "LAYER"; Pick-1; highlight "?"; Pick-1.
2. Tap F1 key (flip screen)
3. Highlight "COLOR"; Pick-1; highlight "BLUE"; Pick-1.
4. Type "BORDER, TITLE"; ENTER.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

TASK PROCEDURE: (continued)

5. Highlight "?"; Pick-1; F1; highlight "color"; Pick-1; highlight "red"; Pick-1.
6. Type "Visible, Hidden"; Enter.
7. Highlight "?"; Pick-1; F1.
8. Highlight "color"; Pick-1; highlight "green"; Pick-1.
9. Type "Center, Dimension, Notes"; Enter.
10. Highlight "?"; Pick-1; F1.

To Assign Line Types:

1. Pick-1 on "AutoCAD"; "LAYER", "L-Type"; "Hidden".
2. Type "Hidden" and Enter.
3. Pick-1 on "Center".
4. Type "Center" and Enter.

To Draw Border:

1. Highlight "Layer"; Pick-1; highlight "Set"; Pick-1.
2. Type "Border" and Enter; Enter again.
3. Highlight "Draw"; Pick-1.
4. Draw a line 1/4" inside all for edges of the screen.
 - a) Select point A; Pick-1.
 - b) Select point B; Pick-1.
 - c) Select point C; Pick-1.
 - d) Highlight "Close"; Pick-1.

Draw Visible Lines:

1. Highlight "AutoCAD"; Pick-1.
2. Highlight "Layers"; Pick-1.
3. "Set"; Pick-1.
4. Type "Visible" and Enter; Enter again.
5. Highlight "AutoCAD"; Pick-1.
6. Type "Snap"; Enter.
7. Type "0.25" and Enter.
8. Tap F7 (Grid On)
*Notice that the distance between the dots represent 1/4".
9. Highlight "Draw"; Pick-1.
10. Highlight "Line"; Pick-1.
11. Move the cursor to the left; notice the crosshairs.
12. From the upper Left Hand corner, move 4 dots (1") down; 3 across (3/4"); Pick-1.
(+) example of the point.
This is your starting point. (Point A)
13. Now move your cursor down 8 dots (2"); Pick-1 (point B).
14. Move your cursor to the right 16 dots (4"); Pick-1 (Point C)
15. Move your cursor toward the top 8 dots (2"); Pick-1 (Point D).



TASK PROCEDURE: (continued)

16. Highlight "close"; Pick-2.
17. To the right of your "Box" Height and width count 3 dots ($3/4$ ") and begin your "box" end.

The procedure is the same as before. Repeat the procedure but change the dimensions to a 2" square.

You will try this on your own with the given steps above.

Title Block:

1. Change "Layer" to "Title".
 - a) Highlight "Layer"; Pick-1.
 - b) Highlight "Set"; Pick-1.
 - c) Type "Title"; Enter; Enter again.A command should appear.
2. Highlight "Draw"; Pick-1.
3. Highlight "Line"; Pick-1.
4. Select your points and draw your lines.
(Refer to NOTES for locations.)

To Erase a Line:

1. Highlight "Edit"; Pick-1.
2. Highlight "Erase"; Pick-1.
3. Move the cursor to the object or line you wish to erase; Pick-1 and Pick-2.

To Draw Letters:

1. Move cursor to AutoCAD as before.
2. Highlight "Draw"; Pick-1.
3. Highlight "Text"; Pick-1.
4. Highlight "Text"; Pick-1.
5. Highlight "Style"; Pick-1.
6. Highlight the style you want; Pick-1.
7. Type in height text "18"; Enter.
8. Answer questions; Enter.
9. Answer questions; Enter.
10. Answer questions; Enter.
11. Highlight "Draw"; Pick-1.
12. Highlight "Text"; Pick-1.
13. Highlight "Text"; Pick-1.
14. Highlight "Fit"; Pick-1.
15. Move cursor where you want the line to begin; Pick-1.
16. Move the cursor to where you want to end; Pick-1.
17. CAPS LOCK.
18. Type the text. (Refer to Notes for wording); Enter.
Repeat your steps for lettering Title Block information.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

TASK PROCEDURE: (continued)

Then on your own type the letters for your "box"!!
(PREMIUM)

To Add Dimensions:

1. Change layer to DIMENSIONS.
2. Highlight "Layer"; Pick-1; highlight "Set"; Pick-1.
3. Type "Dimensions"; Enter.
4. Highlight "Dimension"; Pick-1; Highlight "Linear";
Pick-1.
5. Highlight "Horizontal" or "Vertical"; Pick-1.
6. Locate first point of extension line; Pick-1.
7. Locate second of extension line; Pick-1; point 2.

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Orthographic Drawing

CONDITIONS PROVIDED:

1. Computer, Monitor, Digitizer, and Printer.
2. "AutoCAD" Software
3. Pre-requisite ability to turn computer on and obtain "AutoCAD" Menu, or provision of the same.

PERFORMANCE OBJECTIVES:

1. The student will draw horizontal, and vertical lines.
2. The student will draw circles and arcs.
3. The student will construct a three-view orthographic drawing using straight lines, circles, and arcs.

SUCCESS CRITERIA:

1. Completion of the drawing.
2. Accuracy of the lines, points, and circles.
3. Accuracy of the views and their placement.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Orthographic Drawing

"NEED-TO-KNOW" INFORMATION:

An orthographic drawing is a type of drawing in which an object is viewed from different directions, producing six possible views: top, bottom, front, back, right side, and left side. Generally, only three views are necessary, and the most commonly used are the top, front, and right side.

Each view shows two dimensions as follows:

Top - width and depth

Front - height and width

Right side - height and depth

Notice, each dimension is shown in two views.

By looking at three-dimensional objects through two-dimensional views, we can see that all objects are composed of simple shapes made up of straight lines, circles, and arcs. By the same rule, we can draw any object by using straight lines, circles, and arcs.

The computer is a modern tool which can be programmed to draw all these lines easier, faster, and with greater accuracy than could be done with a T-square and triangles. It is not necessary for us to know how to program the computer in order to draw with AutoCAD. It is, however, necessary that we are able to use commands that the program understands. By using only a few of these commands we can construct an orthographic drawing.

TECHNOLOGY EDU-CAMP ACTIVITY ASSIGNMENT

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Orthographic Drawing

TOOLS AND EQUIPMENT: Computer, Monitor, Digitizer Pad with Mouse, Printer, AutoCAD Software Program.

MATERIALS: Paper

NOTE - "Pick-1" means to tap the #1 on the digitizer mouse.
"Pick-2" means to tap the #2 on the digitizer mouse.
"Pick-1 on AutoCAD" means to move the mouse to highlight the AutoCAD command at the right side of the screen and to "Pick-1".

TASK PROCEDURE:

Set up for Drawing:

1. Pick-1 on "AutoCAD"
2. Pick-1 on "Layer"
3. Pick-1 on "New"
4. Type "Border, Visible, hidden, Center, Notes"; and "Enter".
5. "Enter" again.
6. Pick-1 on "Layer"
7. Pick-1 on "Color"
8. Pick-1 on "Red"
9. Type "Border, Notes"; and "Enter"
10. "Enter" again
11. Pick-1 on "Layer"; then on "Color"; then on "Blue".
12. Type "Visible, Hidden"; and "Enter"; "Enter" again.
13. Pick-1 on "Layer"; then on "Color"; then on "Green".
14. Type "Center"; and "Enter"; "Enter" again.

Set Line Types:

1. Pick-1 on "AutoCAD"; "Layer"; "LType"; "Hidden".
2. Type "Hidden"; and "Enter".
3. Pick-1 on "Center".
4. Type "Center"; and "Enter".

Draw Visible Lines:

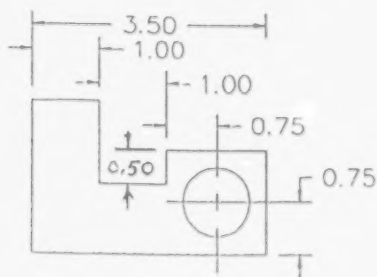
1. Pick-1 on "Layer"; then on "Set".
2. Type "Visible" and "Enter"; "Enter" again.
3. Pick-1 on "AutoCAD".
4. Type "Snap"; and "Enter".
5. Type "0.25"; and "Enter".
6. Tap the "F7".
7. Notice that any two dots represent a distance of $1/4$ ".
8. Pick-1 on "Draw"; then on "Line".
9. Move the mouse to the left until crosshairs appear.
10. From the upper right-hand corner move three dots ($3/4$ ") to the left and three dots ($3/4$ ") down.
11. Pick-1 at that location.
12. Move 4" to the left and Pick-1.
13. Move the mouse out just a little.
14. Watch the screen as you Pick-2; Pick-2 again.
15. Now move $1/4$ " directly under your last point drawn and Pick-1.
16. Move 3" to the right and Pick-1; Pick-2; Pick-2 again.
17. Draw a 2" horizontal line $1/4$ " below the 3" line.
18. Draw five vertical lines 1" long and $1/4$ " apart below and joining the 2" line.

Erase a Line:

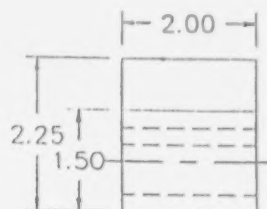
1. Pick-1 on "Edit"; Pick-1 on "Erase".
2. Move the cursor to the center vertical line and Pick-1; Pick-2.
3. Pick-1 on "Draw"; Pick-1 on "Circle"; then "CentRad".
4. Center the crosshairs on the right end of the 2" horizontal line.
5. Type "0.5" and "Enter."

Draw Views:

1. Draw this front view $3/4$ " from the left and $1\ 3/4$ " from the bottom of the screen.



2. Draw this right side view directly to the right of the front view and $\frac{3}{4}$ " from the right of the screen.



3. Draw the top view directly above the front view and 1" down from the top.
4. Pick on AutoCAD"; Pick-1 on "Save".

Draw Hidden Lines:

1. Change layer to "Hidden" and draw hidden lines in the top and right views. Then "Save";

Draw Center Lines:

1. Change layer to "Center" and draw center lines to indicate the center of the hole in all three views. "Save".

Draw Border Lines:

1. Change layer to "Border" and draw a line $\frac{1}{4}$ " inside all edges of the screen.
2. Draw a horizontal line $\frac{3}{4}$ " above the lower border line. Do not extend beyond other borders.
3. Divide this title strip as shown:

4.75	2.50	2.25	1.0
TECHNOLOGY EDUCATION	E. RANDALL JAMES	PLATE #4	12288

Set Up for Notes:

1. Change Layer to "Notes"
2. Pick-1 on "Draw"; then "Next" then "Text".
3. Pick-1 on "Style"; then "Simplex"; then "Simplex" again.
4. Type "0.25" and "Enter"; "Enter" repeatedly until "Command" appears.

Add Notes:

1. Pick-1 on "Draw"; "Next"; "Fit".
2. Pick-1 on the lower first dot in the first block of the title strip.
3. Pick-1 on the lower last dot in the first block of the title strip.
4. Be sure "Cap Lock" is on.
5. Type "Technology Education" and "Enter".
6. Put your full name in the second block of the title strip.
7. Put the plate number in the third block.
8. Put today's date in the last block.
9. "Save".

Print a Copy:

1. Pick-1 on "AutoCAD"; "Plot"; "Printer".
2. Look at the description. It should indicate a rotation of 90 degrees and a scale of 1=1.
If so, "Enter".
If not, Type "Y" and "Enter". Change those two settings only and "Enter".
3. Check to see that paper is correctly aligned; then "Enter".

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: To draw an Isometric drawing consisting
of lines only

CONDITIONS PROVIDED:

1. Computer, Monitor, and Printer
2. "AutoCAD" Software
3. Prerequisite ability to:
 - A. Turn on computers.
 - B. Call up main menu and set up new drawing.
 - C. Draw lines - border and visible.
 - D. Erase lines.
 - E. To save and exit from computer.

PERFORMANCE OBJECTIVES:

1. Set up for new drawing and get into isometric mode
2. Draw isometric and non-isometric lines.
3. To locate and center the drawing.

SUCCESS CRITERIA:

1. Completion of drawing.
2. Accuracy of lines.
3. Placement of drawing.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: To draw an isometric drawing consisting of lines only

"NEED-TO-KNOW" INFORMATION:

An isometric drawing is a picture type drawing rotated in such a way as to show three sides. It is often an aid to an orthographic drawing in that it gives a realistic picture of the object viewed.

Three dimensions (depth, width and height) are all shown on an isometric drawing. The rotation of the drawing puts the horizontal lines of an orthographic at an angle of 30 degrees to the x-axis. All measurements of width and depth must be made along these axes. Height is still measured along the vertical axis. Non-isometric lines can be drawn by locating their end points and drawing. They do not show true length in an isometric and so cannot be measured.

The computer does the drawing of the proper angles and easily locates end points so that non-isometric lines can be easily drawn. Drawings made on computers are fast, efficient and done with little effort by learning to use a few simple commands.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: To draw an isometric drawing consisting of lines only

TOOLS AND EQUIPMENT:

Computer, Monitor, Digitizer Pad with Mouse, Printer,
AutoCAD Software Program

MATERIALS:

Paper

TASK PROCEDURE:

1. Properly turn on computer and call up main menu.
2. Set up computer for a new drawing by correctly entering layers, and line types.
3. Draw border lines and title strip.

To get into Iso mode:

1. Get a command on monitor and type in "snap" - enter it.
2. Type in letter "S" - enter it.
3. Type in letter "I" - enter it; enter it again.
4. Move mouse on digitizing pad until, the crosshairs show on the monitor and in isometric planes.
5. To move the isometric axes lines from plane to plane, hit control (CTRL) and letter E at the same time.

To draw lines of a drawing to be provided by the instructor:

1. Be sure axes are in the correct isometric plane.
2. On the menu highlight "draw" with the mouse - pick it.
3. On the menu highlight "line" with the mouse - pick it.
4. All lines of width, depth and height to be drawn the same way as in an orthographic drawing.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

TASK PROCEDURE: (continued)

To draw non-isometric lines.

1. Turn ortho (F8) off.
2. Highlight "draw" - pick it. Highlight "line" - Pick 1.
3. Locate the first point of the line with crosshairs - Pick 1.
4. Locate end point of the line with the crosshairs - Pick 1.
5. Pick it 2 on the mouse to free crosshairs from the line.
6. Turn ortho (F8) back on for isometric lines.

Draw every "line of drawing" until complete.

If drawing not completely centered.

1. Call up "edit" on menu; highlight - Pick 1.
2. Highlight "Move" on menu - Pick 1.
3. Highlight "Window" on menu - Pick 1
4. Locate point for window to begin - Pick 1.
5. Move mouse until the window surrounds the drawing - Pick 1.
6. Pick 2 on the mouse.
7. Move mouse to the side of the drawing in the direction you plan to move, locate a point on that side and Pick 1.
8. You can move the drawing in only 1 direction; horizontally or vertically.
9. Move drawing horizontally to desired place - Pick 1.
10. Repeat all the steps (1-8) to move vertically until the drawing is centered.

To get out of the Isometric mode:

1. Get command on the screen and type in "SNAP"; enter it.
2. Type in "S"; enter.
3. Type in "S"; enter; enter again.

Type in "Text" in title strip according to the proper commands. Send to printer. When the drawing is finished, "Save", and exit computer.

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Architectural Drawing

CONDITIONS PROVIDED:

1. Appropriate computer hardware and software
2. Pre-requisite abilities
 - a) Get into the CAD program
 - b) Draw lines, segments, and arcs
 - c) Dimension a drawing
 - d) Obtain hard copy
 - e) Sketch with a pencil and paper
 - f) Measure with a carpenter's tape

PERFORMANCE OBJECTIVES:

1. The student will measure and sketch his/her bedroom, including windows and doors.
2. The student will transform his/her sketch into a scaled CAD drawing.

SUCCESS CRITERIA:

1. Completion of the drawing
2. Accuracy of the drawing

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Architectural Drawing

"NEED-TO-KNOW" INFORMATION:

The student must be somewhat familiar with AutoCAD and should know how to use a measuring tape. Since each student's drawing will be different, there will be a great deal of independent work for the students; therefore, this project might be placed near the end of the CAD study session.

TECHNOLOGY EDU-CAMP ACTIVITY ASSIGNMENT

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Architectural Drawing

TOOLS AND EQUIPMENT:

Computer, monitor, digitizer pad with mouse, printer (or plotter), AutoCAD (similar software), 12' steel carpenter's tape.

MATERIALS:

paper, pencil, sketch of bedroom (dorm room)

TASK PROCEDURE:

A. Sketch room:

1. Sketch an appropriate shape for the room on a sheet of paper.
2. Measure the walls of the room and mark their lengths (to the nearest whole inch) on the sketch.
3. Measure and mark the locations and sizes of windows, doors, cabinets, and closets. Use arcs to indicate the direction of swing of doors.

B. Set up for the drawing:

1. On the AutoCAD menu, enter "1".
2. Enter your name with "OK" on the end.
3. Hit F6, F7, F8, and F9.
4. Pick "AutoCAD".
5. Pick "Set up".
6. Pick "Architect".
7. Pick "1/4" = 1".
8. Pick "A-8.5X11".
9. Pick "SETTINGS".
10. Pick "next".
11. Pick "UNITS".
12. Type "4" and hit ENTER six times.
13. Hit F1.
14. Enter "grid".
15. Enter "1".

TECHNOLOGY EDU-CAMP
LAB ACTIVITY SHEET

UNIT TITLE: Computer Aided Drafting

LAB ACTIVITY TITLE: Architectural Drawing

TASK PROCEDURE: (continued)

- C. Set line types and layer colors:
 - 1. All layers should use visible lines.
 - 2. Set the layer colors as usual: border-blue, dim-green, wall-red, and note-cyan
- D. Border and title the drawing as usual.
- E. Draw the walls, windows, and doors:
 - 1. Switch to wall layer.
 - 2. Draw exterior walls 7" thick.
 - 3. Draw interior walls 5" thick.
- F. Dimension drawing:
 - 1. Switch to dimension layer.
 - 2. adjust arrow and text size of dimensions:
 - a. Pick "AutoCAD".
 - b. Pick "DIM".
 - c. Pick "dimvar".
 - d. Pick "arwsz".
 - e. Pick "6".
 - f. Do a, b, and c again.
 - g. Pick "tstsz".
 - h. Enter "6".
 - 3. Place dimensions
- G. Write notes:
 - 1. Switch to note layer.
 - 2. Use leaders to make notations for wall thicknesses.
- H. Save drawing.
- I. Print drawing.

LABORATORY

ACTIVITY

PACKETS

for

ELECTRONICS

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TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Electronics Terminology

CONDITIONS PROVIDED:

Classroom Activity - Electronic Term Sheet,
Oscilloscope, Ohmmeter and Amp Meter

PERFORMANCE OBJECTIVES:

1. Become familiar with terms associated with electronics.
2. Use Ohmmeter to measure current resistance.
3. Use Amp Meter to measure force of electricity..
4. Use oscilloscope to show and measure flow electrons.

SUCCESS CRITERIA:

1. Pass test on Electronic Terminology
2. Have working knowledge of electronic measurement tools.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Electronic Terminology

"NEED-TO-KNOW" INFORMATION:

Necessary Information

- A. Laws of Electronics - Statements that explain something happening in nature.
(1) Ohms Law - Amount of current is proportional to the resistance.
- B. Voltage - Force of Electrical Pressure
- C. Oscilloscope - A screen used to show a measured flow of electrons.
- D. Word - Grouping of bits together that has meaning to system.
- E. Bit - Individual part of a function (X,+, Y).
- F. Nibble - 4 bits.
- G. Byte - 8 bits.
- H. Kilo - 1024 bytes.
- I. Current - Flow of Electrons along a conductor.
- J. Binary - Base two number system consisting of the digits 0 - 1.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Electronic Terminology

TOOLS AND EQUIPMENT:

Oscilloscope, Amp meter, Ohm meter
Circuit board with light bulb
Transistors, diodes, and resistors

MATERIALS:

Circuit board with light bulb, transistors, resistors,
and diodes.

TASK PROCEDURE:

Check voltage levels, Amps and Ohm's with oscilloscope,
Amp meter and Ohm meter.

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Electronic Terminology

QUIZ:

Matching

- | | |
|------------------------|--|
| 1. Voltage | _____ 4 bits |
| 2. Oscilloscope | _____ 1024 Bytes |
| 3. Binary | _____ 8 bits |
| 4. Kilo | _____ Flow of Electrons
along a conductor |
| 5. Nibble | _____ Base two number
system consisting of
the digits 0-2. |
| 6. Word | _____ Individual part of a
function (x,+,y) |
| 7. Current | _____ Force of Electrical
pressure |
| 8. Laws of Electronics | _____ Grouping of bits
together that has
meaning to a system. |
| 9. Bit | _____ A screen used to show
a measure flow of
electrons. |
| 10. Byte | _____ Statements that
explain something
happening in nature
relating to
electronics. |

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Electronics Terminology

QUIZ ANSWERS:

1. 10
2. 4
3. 5
4. 7
5. 3
6. 9
7. 1
8. 6
9. 2
10. 8

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Electronics - Symbols and Terms

CONDITIONS PROVIDED:

PERFORMANCE OBJECTIVES:

The students will identify the "AND" GATE, "OR" GATE, "NAND GATE", "NOR" GATE symbols. The students will match and draw the schematic symbols for each. The students will begin developing a TRUTH TABLE.

SUCCESS CRITERIA:

The students will be able to identify the symbols "AND", "OR" GATE, "YES" GATE - understand that NAND and NOR GATES are the inverted process and opposite.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Electronics Symbols and Terms

"NEED-TO-KNOW" INFORMATION:

VOCABULARY

Binary Coded Decimal (BCD) - a binary numbering for coding decimal numbers in groups of 4 BITS. The binary value of these 4-BIT group ranges from 0000 to 1001 and coded the decimal digits 0 through 9. To count to 9 takes 4 bits; to count to 99 takes two groups of 4 bits; to count to 999 takes three groups of 4 bits.

BIT - A synonym for a binary numeral.

BOOLEAN Algebra - The mathematics of logic which uses alphabetic symbols to represent variables and 1 and 0 to represent states. There are three basic logic operations in this Algebra: AND, OR and NOT. (NAND, NOT invert these operations.

Chip (Die) - A single piece of silicon which has been cut a slice by scribing and breaking. It can contain one or more circuits but is packaged as a unit.

AC - Alternating current direction current flows reverses at regular intervals.

DC - Direct current in which an electric current flows in direction only.

DIODE - A device permitting current to flow in one direction only.

GATE, "AND" - All inputs must have 1 level signals at the input to produce a 1 level output.

GATE, "NAND" - All inputs must have 1 level signals at the input to produce a 0 level output.

GATE, "NOR" - Any one input or more than one input having a 1 level signal will produce a 0 level output.

GATE, "OR" - Any one input or more than one input having a 1 level signal will produce a 1 level output.

GATES - A circuit which allows current to flow "in or out".

OHM - The unit used to express resistance. One Ohm is the resistance against which one volt will cause a current of one ampere to flow.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Electronics Symbols and Terms

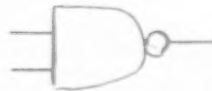
TOOLS AND EQUIPMENT:

MATERIALS:

Pencil and Paper

TASK PROCEDURE:

The students will be given a sheet illustrating the schematics. This is the basic area to begin to understand how the electronic circuit works.



TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

TASK PROCEDURE: (continued)

YES GATE:



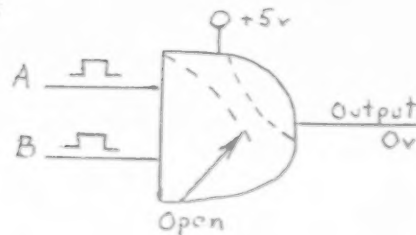
The gate is so named yes because the output remains the same.

This is an amplifier stage.

Truth Table

Input	Output

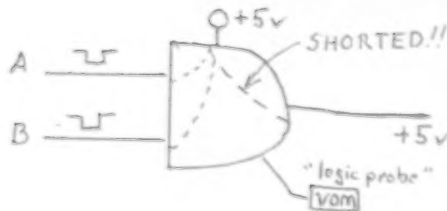
OR GATE:



If an AND GATE should open, two highs could produce a low.

Truth Table

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1



If the same "AND" gate should short 2 lows could output as a High.

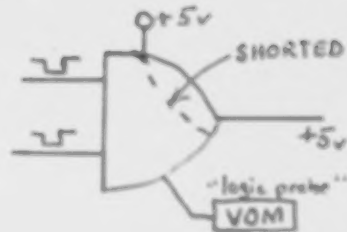
Truth Table

A	B	Output
0	0	0
0	1	0
1	0	0
1	1	1

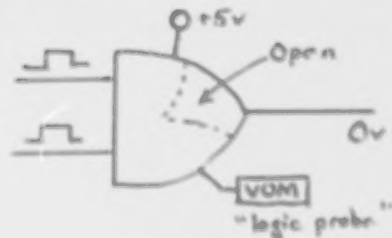
TECHNOLOGY EDU-CAMP ACTIVITY ASSIGNMENT

TASK PROCEDURE: (continued)

If the "OR" gate should short 2 lows could read as an output High.



The OR gate is open could output a low even though 2 highs are input.



All gates have a Truth Table.

Truth tables got their name from the engineers that were using true and false to describe high and low levels of energy. If they had been using high and low, the tables might have been called the High Table.

Technicians think of H (high) (⌋) and L (low) (⌋) when they see the truth table. The truth table might contain any of the logical state descriptions shown below.

Logical 1 (Input)

True
High
H
+5.v
Set
Set
Yes
⌋
1

Logical 0 (Output)

False
Low
L
0V
Clear
Reset
No
⌋
0

This is an example of a voltage state test table.

Now, add the truth tables for the
"AND" gate
"OR" gate

As a review, you will need to restate the names of the "AND", "OR", "NAND", "NOR" gates and illustrate each.

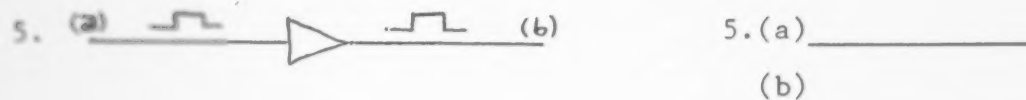
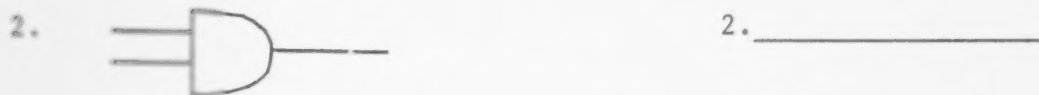
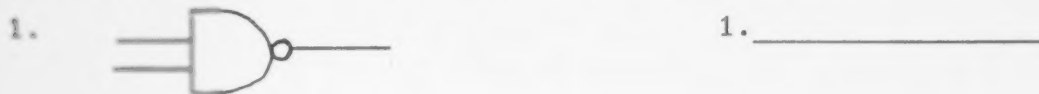
TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE:

LAB ACTIVITY TITLE:

QUIZ:

Directions: Fill in the correct name of each symbol given below using the information given in this lesson.



6.

A	B	Output
0	0	?
0	1	?
1	0	?
1	1	?

7. What is the table in #6 called?

8. What is the NOT symbol?

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Electronics Symbols and Terms

QUIZ ANSWERS:

1. NAND
2. AND
3. NOR
4. OR
5. Input, Output
6. 0
1
1
1
7. Truth Table
8. 0

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Drawing to Scale an OR Generator

CONDITIONS PROVIDED:

1. Drawing board, architect scale, triangle, 2H drawing pencil
2. Handout sheet with drawing of generator
3. Prerequisite ability to use drafting equipment

PERFORMANCE OBJECTIVES:

1. The student will list and pronounce electronic terms and symbols.
2. The students will draw the circuit to scale showing symbols.
3. The student will discuss and explain the drawing.

SUCCESS CRITERIA:

1. Completion of the drawing.
2. Explanation of the drawing.
3. Accuracy of the symbols and their placement.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Draw to Scale a Electrical Circuit

"NEED-TO-KNOW" INFORMATION:

The students need to know how to use drafting equipment and to understand basic symbols for electronics. This will be given to them on handouts to prepare them for the theory part of the activity.

Circuits are diagrams to help us to better understand electronic equipment and also to help us appreciate the technicians that service the equipment that we use on a daily basis.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Drawing to Scale an OR Generator

TOOLS AND EQUIPMENT:

Drawing Board, T-Square, Triangle, Architect Scale,
Drafting Tape, 2H Drawing Pencil.

MATERIALS: Paper

Students will receive typing paper along with a handout
sheet with a diagram drawn to scale.

TASK PROCEDURE:

Set up for drawing

1. Measure dimensions etc. on handout sheet.
2. Draw borderline and title block on paper.
3. Draw diagram of the electrical circuit.
4. Put in all symbols on drawing and all text.

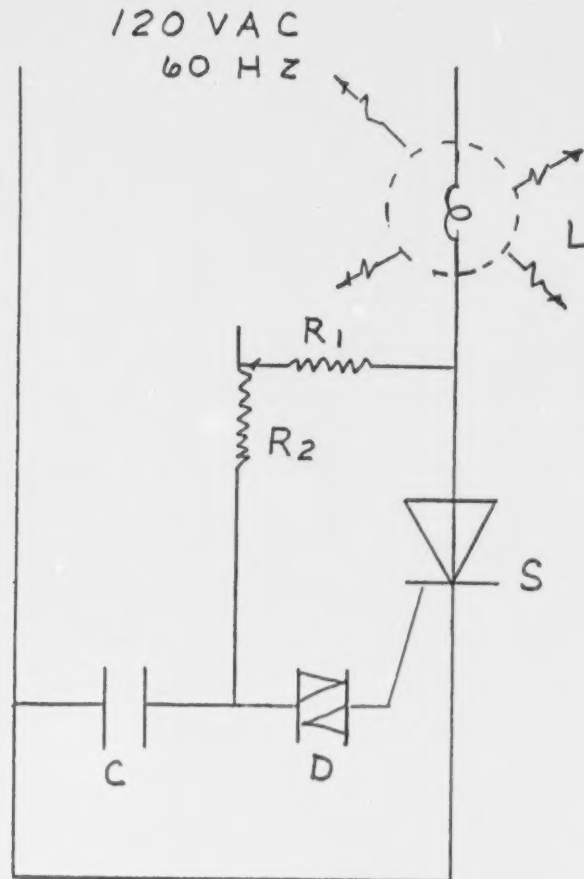
TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Drawing to Scale an OR Generator

QUIZ:

Draw to scale:



LIGHT SYSTEM

L - 100 W	120 V	LIGHT
S - 400 V	6 A	SCR
D - ST-2	27 V	DIAC
R_1 20K Ω	1/2 W	RESISTOR
R_2 100K Ω	1/2 W	POTENTIOMETER
C 0.1 μ F	200 V	CAPACITOR

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Drawing To Scale an OR Generator

QUIZ ANSWERS:

The drawing will be used to test or evaluate the students.

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Converting Hex Numbers to Decimal
Numbers

CONDITIONS PROVIDED:

Classroom, Preliminary Instruction in Hex Number
Conversion

The student will be taught the 16 digits in the hex
system and understand the concepts of face and place
value.

PERFORMANCE OBJECTIVES:

The student will be able to convert hexadecimal numbers
to base ten numbers.

SUCCESS CRITERIA:

Conversion of numbers at 90% accuracy.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Hex Number Conversion

TOOLS AND EQUIPMENT: Pencil, Paper, Desks

MATERIALS:

Handout of Problems.

DEAD, DAD, ADD, BED, FAD, FOOD, BAD, DAB, BABE, BOD

TASK PROCEDURE:

The student is to convert the given hex numbers to decimal.

1. Multiply the face value of the digit in the unit's place by 1 to obtain #1.
2. Multiply the face value of the digit in the 16's place by 16 to obtain #2.
3. Multiply the face value of the digit in the 16 place by 16 to obtain #3.
4. Multiply the face value of the digit 4.5 in the 16 place by 16 to obtain #4.
5. Add #1, #2, #3, and #4 to obtain the base ten number.

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Hex Number Conversion

QUIZ:

Change the following Base 16 numbers to base ten.

1. DADE
2. FADE
3. EBB
4. BE
5. BEAD
6. ABODE
7. AID
8. FEED
9. DEAF
10. FED

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Hex Numbers Conversion

QUIZ ANSWERS:

1. 56,030
2. 64,222
3. 3771
4. 190
5. 48,813
6. 700,638
7. 2589
8. 65,261
9. 57,007
10. 4077

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Electronics - Seventh Grade

LAB ACTIVITY TITLE: Setting up and solving Equations Using
Ohms Laws

CONDITIONS PROVIDED:

1. Terminology has been taught.
2. Ohmmeter has been used.
3. Basic formula taught.

PERFORMANCE OBJECTIVES:

1. Students will be able to set up equations to find missing part.
2. Students will be able to recognize symbols in equations.
3. Students will be able to solve simple equations.

SUCCESS CRITERIA:

1. Missing parts of equation inserted correctly.
2. Correct math functions used.
3. Correct solutions.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Electronics - Seventh Grade

LAB ACTIVITY TITLE: Setting Up and Solving Equations Using
Ohm's Law

"NEED-TO-KNOW" INFORMATION:

1. E = Electrical force. E is measured in Volts.
2. I = Current. I is measured in Amps
3. R = Resistance. R is measured in Ohms.
4. Ohm's Law give to students is $E = I \times R$.

111

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics - Seventh Grade

LAB ACTIVITY TITLE: Setting Up and Solving Equations Using
Ohm's Law

TOOLS AND EQUIPMENT:

None

MATERIALS:

Paper, pen or pencil

TASK PROCEDURE:

Part I

1. Set up equation if Amps and Ohms are given.
2. Set up equation if Volts and Amps are given.
3. Set up equation if Volts and Ohms are given.

Part II

Check Equations

1. $E = I \times R$
2. $R = E/I$
3. $I = E/R$

Part III

Set and solve equations for each of the following:

1. You have 4 Amps and 2 Ohms. Find Volts.
2. You have 120 Volts and 40 Amps. Find Ohms.
3. You have 240 Volts and 60 Ohms. Find Amps.

Part IV

Check Solutions

1. $E = I \times R$
 $E = 4 \times 2 E = 8$

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics - Seventh Grade

LAB ACTIVITY TITLE: Setting Up and Solving Equations Using
Ohm's Law.

TASK PROCEDURES: (continued)

Part IV

1. $E = I \times R$
 $E = 4 \times 2E = 8$

2. $R = E/I$
 $R = 120/40$
 $R = 30$

3. $I = E/R$
 $I = 240/60$
 $I = 40$

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Problem Solving Using Ohm's Law

CONDITIONS PROVIDED:

PERFORMANCE OBJECTIVES:

1. Students will recognize the symbols used in Ohm's Law.
2. Given a real life problem, students will use the Ohm's Law equation to solve it.

SUCCESS CRITERIA:

1. Correct substitution of values for symbols.
2. Correct completion of equation.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Problem Solving Using Ohm's Law

"NEED-TO-KNOW" INFORMATION:

1. Basic problem solving procedures
2. Ohm's Law Equation: $E = I \times R$
E = Electromotive force measured in volts
I = Intensity of current measured in amperes
R = Resistance to current measured in Ohms.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Problem Solving Using Ohm's Law

TOOLS AND EQUIPMENT:

MATERIALS:

Paper and Pencil

TASK PROCEDURE:

The student will set up and solve the equation for each of the following problems:

1. How much voltage will travel across a resistor with a resistance of 30 Ohms and an intensity of 150 Amps?
2. If 120 volts comes out of a resistor with a resistance of 5 Ohms, what is the intensity of the current?
3. A resistor with a current intensity of 2000 Amps will emit how many volts if the resistance is .8 Ohms?
4. If 4000 volts leaves a resistor, what is the resistance when the intensity is 25 Ohms?
5. A resistance of 55 Ohms with an intensity of 135 Amps will yield what level of voltage?

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

TASK PROCEDURE: (continued)

Answer Key

1. $E = I \times R$
 $E = 150 \times 30$
 $E = 4500 \text{ Volts}$
2. $E = I \times R$
 $120 = I \times 5$
 $24 \text{ Amps} = I$
3. $E = I \times R$
 $E = 2000 \times .8$
 $E = 1600 \text{ Volts}$
4. $E = I \times R$
 $4000 = 15 \times R$
 $160 \text{ Amps} = R$
5. $E = I \times R$
 $E = 135 \times 55$
 $E = 6425 \text{ Volts}$

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Solving Problem's Using Ohm's Law

CONDITIONS PROVIDED:

1. Provide students with objective sheet.
2. Provide students with information and assignment sheets.
3. Discuss unit and specific objectives.
4. Discuss information and assignment.

PERFORMANCE OBJECTIVES:

1. Match terms related to basic electronic theory with the correct definitions.
2. Complete Ohm's Law formula.
3. Demonstrate the ability to solve problems using Ohm's Law.

SUCCESS CRITERIA:

After completion of this unit, the student will be able to solve problems using Ohm's law. This knowledge will be evidenced by correctly performing the procedure outlined in the assignment sheet and by scoring 85 percent on the unit test.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Solving Problems Using Ohm's Law

"NEED-TO-KNOW" INFORMATION:

I. Terms and definitions

- A. Electron - An elementary atomic particle having a negative charge.
- B. Electronics - A branch of physics dealing with electrons and electronic devices.
- C. Voltage - The representation of the electromagnetic force designated by the letter V or E.
- D. Current - The number of electrons flowing past a point in a given period of time.
- E. Ampere - The measure of the electric current represented by the letter A or I.
- F. Resistance - The opposition to the flow of current represented by the letter R and measured in Ohms.
- H. Circuit - The complete path of an electric current

II. Ohm's Law

- A. Voltage (E) = Ampere (I) x Resistance (R)
- B. $E = I \times R$
- C. $I = E/R$
- D. $R = E/I$

III. Examples

- A. Find E if $I = 2 \text{ A}$ and $R = 50 \text{ Ohms}$
Using the formula $E = I \times R$
 $E = (2\text{A}) \times (50 \text{ Ohms})$
 $E = 100 \text{ volts}$
- B. Find I if $R = 2000 \text{ Ohms}$ and $E = 10 \text{ volts}$
Using the formula $I = E/R$
 $I = (10 \text{ volts} / (2000 \text{ ohms}))$
 $I = .005 \text{ A}$
- C. Find R if $E = 12 \text{ volts}$ and $I = 2 \times 10^{-3} \text{ Ohms}$
Using the formula $R = E/I$
 $R = (12 \text{ volts}) / (2 \times 10^{-3} \text{ A})$
 $R = 6000 \text{ Ohms}$

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Solving Problems using Ohm's Law

TOOLS AND EQUIPMENT: Paper and Pencil

MATERIALS:

Problems to solve

TASK PROCEDURE:

Solve the following problems using Ohm's law:

A. $I = \frac{E}{R}$
 $E = 15 \text{ volts}$
 $R = 3 \times 10^3 \text{ ohms}$

B. $E = IR$
 $I = 4 \times 10^3 \text{ A}$
 $R = 75 \text{ ohms}$

C. $I = \frac{E}{R}$
 $E = 10 \text{ volts}$
 $R = 50 \text{ ohms}$

D. $R = \frac{E}{I}$
 $E = 2 \text{ volts}$
 $I = 2 \text{ A}$

E. $E = IR$
 $I = .5 \text{ A}$
 $R = 100 \text{ ohms}$

F. $R = \frac{E}{I}$
 $I = .001 \text{ A}$
 $E = .01 \text{ volts}$

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Solving Problems Using Ohm's Law

TASK PROCEDURE: (continued)

ANSWERS

$$\begin{array}{l} \text{A. } I = \frac{5 \times 10^{-3} \text{ A}}{15 \text{ Volts}} \\ E = 15 \text{ Volts} \\ R = 3 \times 10^3 \text{ Ohms} \end{array}$$

$$\begin{array}{l} \text{B. } E = \frac{300 \times 10^{-3} \text{ V}}{4 \times 10^3 \text{ A}} \\ I = 4 \times 10^3 \text{ A} \\ R = 75 \text{ Ohms} \end{array}$$

$$\begin{array}{l} \text{C. } I = \frac{.2 \text{ A}}{10 \text{ Volts}} \\ E = 10 \text{ Volts} \\ R = 50 \text{ Ohms} \end{array}$$

$$\begin{array}{l} \text{D. } R = \frac{1 \text{ Ohm}}{2 \text{ Volts}} \\ E = 2 \text{ Volts} \\ I = 2 \text{ A} \end{array}$$

$$\begin{array}{l} \text{E. } E = \frac{50 \text{ Volts}}{.5 \text{ A}} \\ I = .5 \text{ A} \\ R = 100 \text{ Ohms} \end{array}$$

$$\begin{array}{l} \text{F. } R = \frac{10 \text{ Ohms}}{.001 \text{ A}} \\ I = .001 \text{ A} \\ E = .01 \text{ Volts} \end{array}$$

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Solving Problems Using Ohm's Law

QUIZ:

1. Complete Ohm's Law formulas:

A. $I =$

B. $E =$

C. $R =$

2. Solve the following problems using Ohm's Law:

A. Find E if $I = .2 \text{ A}$ and $R = 150 \text{ Ohms}$

B. Find R if $E = 6 \text{ volts}$ and $I = .002 \text{ A}$

C. Find I if $E = 24 \text{ volts}$ and $R = 3 \times 10^{-3} \text{ Ohms}$

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Solving Problems Using Ohm's Law

QUIZ ANSWERS:

1. Complete Ohm's Law formulas:

A. $I = E/R$

B. $E = I \times R$

C. $R = E/I$

2. Solve the following problems using Ohm's Law:

A. Find E if $I = .2 \text{ A}$ and $R = 150 \text{ ohms}$

Using the formula $E = I \times R$

$$E = (.2 \text{ A}) \times (150 \text{ ohms})$$

$$E = 30 \text{ volts}$$

B. Find R if $E = 6 \text{ volts}$ and $I = .002 \text{ A}$

Using the formula $R = E/I$

$$R = (6 \text{ volts}) / (.002 \text{ A})$$

$$R = 3000 \text{ ohms}$$

C. Find I if $E = 24 \text{ volts}$ and $R = 3 \times 10^{-3} \text{ ohms}$

Using the formula $I = E/R$

$$I = (24 \text{ volts}) / 3 \times 10^{-3} \text{ ohms}$$

$$I = 8000 \text{ A}$$

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Soldering

CONDITIONS PROVIDED:

1. Soldering Pencil
2. Solder
3. Lamp Cord Electrical Wire
4. Needle Nose Pliers with Side Cutter
5. Knife
6. Damp Cloth
7. File

PERFORMANCE OBJECTIVES:

1. Solder wire end of twisted wire.
2. Tin tip of soldering pencil.
3. Operate Soldering Pencil with Safety.

SUCCESS CRITERIA:

1. Correctly tin the soldering pencil tip.
2. Solder end of twisted wire.
3. Not get burned.
4. Get approval of instructor.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Soldering

"NEED-TO-KNOW" INFORMATION:

Soldering is a form of brazing in which nonferrous filler metals having temperatures below 800 degrees F are used. The filler metal is called solder and is distributed between surfaces by capillary action. The solder will flow to the heat source.

Solder is a tin-lead alloy and depending upon the amount of mixture, melts between 375 degrees F to 590 degrees F. A cleaning substance must be present when soldering and the cleaning agent is called a flux. The flux used in electrical work is rosin because it is noncorrosive. The wire of solder is hollow and the rosin is in the core of the wire.

The point or tip of the soldering pencil must be clean and covered with a thin coat of solder to operate properly. The process of covering the tip with solder is tinning. Overheating or failure to keep the tip clean causes the tip to become covered with oxide. Good soldering is done with a clean tip, correct heat applied, and just enough solder to join the pieces.

In any soldering operation, all pieces to be soldered must be hot enough to just melt the solder and have it flow. A strong bond is achieved only if the molten solder is spread evenly over the surfaces to be joined.

The soldering pencil can vary in size from 25 watts to 550 watts. Use the smallest and lowest wattage size that will produce enough heat to do the job. Light weight, low voltage sizes with replaceable tips and heating elements are preferred for electronic work.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Soldering

TOOLS AND EQUIPMENT:

Soldering Pencil, Work Area, Soldering Pencil Holder,
Needle Nose Pliers with Side Cutter, File, Knife, and
Damp Cloth

MATERIALS:

Lamp Cord Wire
Solder

TASK PROCEDURE:

Tinning Solder Tip

1. Clean Tip of soldering pencil with the file. Remove the old solder, scale, or corrosion.
2. Plug soldering pencil into 110 v AC outlet.
3. Hold soldering pencil in one hand, like a writing pencil, and the solder in the other hand.
4. Unwind about five or six inches of solder from the spool.
5. Touch the solder to the soldering pencil tip and heat the soldering pencil until the tip will melt the solder.
6. Cover the tip with a thin layer of solder.
7. Wipe solder tip, gently, with the damp cloth to remove excess solder.
8. Show to instructor.
9. Place soldering pencil in the holder.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

TASK PROCEDURE: (continued)

Solder Wire End

1. Pick up lamp cord.
2. Use knife to separate the two wires by cutting down between the two wires about four inches.
3. Expose about one-half inch of wire on the end by removing the insulation.
4. Cut around the wire just through the insulation with the knife. Be careful and don't cut any of the wire strands.
5. Strip off the small strip of insulation.
6. Twist the wire end as though you were tightening a nut on it. This gives the appearance of a solid wire without any stray ends.
7. Lay wire on table top so the twisted end of the wire is hanging just off the table edge.
8. Use a weight to hold the wire in position.
9. Hold soldering pencil and solder in your hands just like you did while tinning the tip.
10. Place the tip of the soldering pencil under the wire end and touch the bare wire.
11. Heat the wire for about five seconds and then touch the solder to the top of the heated wire over the soldering tip.
12. Always keep the wire to be soldered, between the soldering tip and the end of the solder. The melted solder will flow to the heat source.
13. If the solder vaporizes, remove the soldering tip from the wire and let wire cool.
14. Keep testing the wire with the end of the solder and when it gets to the correct temperature, the solder will melt and solder the wire ends together.
15. Move the solder along the bare wire and let the melted solder fill the twisted wire. Apply more heat with soldering pencil, if needed, to the bottom of the bare wire.
16. Replace the soldering pencil.
17. Wipe the soldered wire end with the cloth to remove excess solder.
18. Let cool and show instructor for critique.

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Soldering

QUIZ:

1. Why is a flux needed when soldering?
2. What is meant by tinning?
3. What is the lowest and highest melting point of soft solder?
4. What are the two materials used to make solder?
5. What flux is used in electronic soldering?
6. Should the solder be melted by touching it to the soldering tip or touching the heated wire?
7. If the solder vaporizes during the soldering process, what do you do with the soldering tip?

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Electronics

LAB ACTIVITY TITLE: Soldering

QUIZ ANSWERS:

1. Keeps soldering joint free of oxide
2. Clean and cover soldering tip with a thin layer of solder
3. 375 degrees F to 590 degrees F
4. Tin - lead
5. Rosin
6. Touching the heated wire
7. Remove tip from wire and let wire cool

TECHNOLOGY EDU-CAMP
Laboratory Activity Packets
for
Exploratory Industrial Technology Education

UNIT TITLE: Electronics (Building a SCR Controlled Light)

LAB ACTIVITY TITLE: Electrical Symbols in the Electrical
Diagram

CONDITIONS PROVIDED:

1. Finished SCR controlled light for demonstration.
2. Electrical parts for the building of their own boards.
3. Prerequisite understanding of basic electricity in terms of pressure, current and resistance.

PERFORMANCE OBJECTIVES:

1. Learn the function of the components used in the project.
2. Learn symbol for each electrical component.

SUCCESS CRITERIA:

Test on matching the symbol with the electrical component or using the electrical diagram and identifying the symbol along with the electrical components' function.

TECHNOLOGY EDU-CAMP
INFORMATION SHEET

UNIT TITLE: Electronics (Building a SCR Controlled Light)

LAB ACTIVITY TITLE: Electrical Symbols in the Electrical
Diagram

"NEED-TO-KNOW" INFORMATION:

In order to build anything which is of electrical structure, you are going to need an electrical schematic. An electrical schematic is a diagram that shows components as symbols and electrical connections of components to each other. A pictorial drawing could be used if the device is very simple. Not many electrical things are simple enough for the use of pictorial drawings. Schematics employ a vast number of symbols and texts for these symbols. We will learn a few of these in this assignment.

A simple understanding of these symbols and their electrical parts will enable you to eventually build even more complex projects and with an understanding of the relationship that exists between components when placed into working circuits.

You are going to need to recall the terms Ohms, Amperes, Volts, Watts, Farads, and their symbols to completely understand this assignment.

TECHNOLOGY EDU-CAMP
ACTIVITY ASSIGNMENT

UNIT TITLE: Electronics (Building a SCR Controlled Light)

LAB ACTIVITY TITLE: Electrical Symbols in the Electrical
Diagram

TOOLS AND EQUIPMENT:

1. A completed SCR controlled light board.
2. 120v voltage source.

MATERIALS:

1. 100w 120v light
2. 400v 6A SCR
3. ST-2 27v DIAC
4. 20k Ω 1/2w Resistor
5. 100k Ω 1/2w Potentiometer
6. 0.1 μ F 200v capacitor

TASK PROCEDURE:

1. Draw the symbol of each electrical component discussed.
2. Match the electrical symbol with the proper electrical part.
3. Identify the electrical symbol in the diagram provided by the instructor for the SCR controlled light board.
4. List the purpose or function of each electrical part in the diagram.

TECHNOLOGY EDU-CAMP
LAB ACTIVITY QUIZ

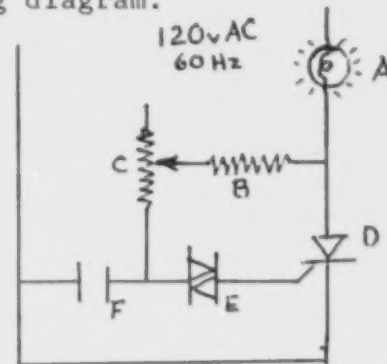
UNIT TITLE: Electronics (Building a SCR Controlled Light)

LAB ACTIVITY TITLE: Electrical Symbols in the Electrical Diagram

QUIZ:

Identify each symbol in the following diagram.

1. A. _____
2. B. _____
3. C. _____
4. D. _____
5. E. _____
6. F. _____



Match the function of the electrical part to the electrical part.

- _____ 7. Capacitor
- _____ 8. diac
- _____ 9. resistor
- _____ 10. potentiometer
- _____ 11. SCR

- A. A variable resistor used as a voltage divider.
- B. A two lead AC semiconductor that will conduct when its breakdown voltage is reached.
- C. A semiconductor device having anode, cathode, and gate used for current values generally higher than those carried by transistors.
- D. Two conductors separated by an insulator
- E. A device that will oppose the flow of current in an electrical circuit.

TECHNOLOGY EDU-CAMP
QUIZ ANSWERS

UNIT TITLE: Electronics (Building a SCR Controlled Light)

LAB ACTIVITY TITLE: Electrical Symbols in the Electrical
Diagram.

QUIZ ANSWERS:

1. A. Light
2. B. Resistor
3. C. Potentiometer
4. D. SCR
5. E. diac
6. F. capacitor
7. D
8. B
9. E
10. A
11. C